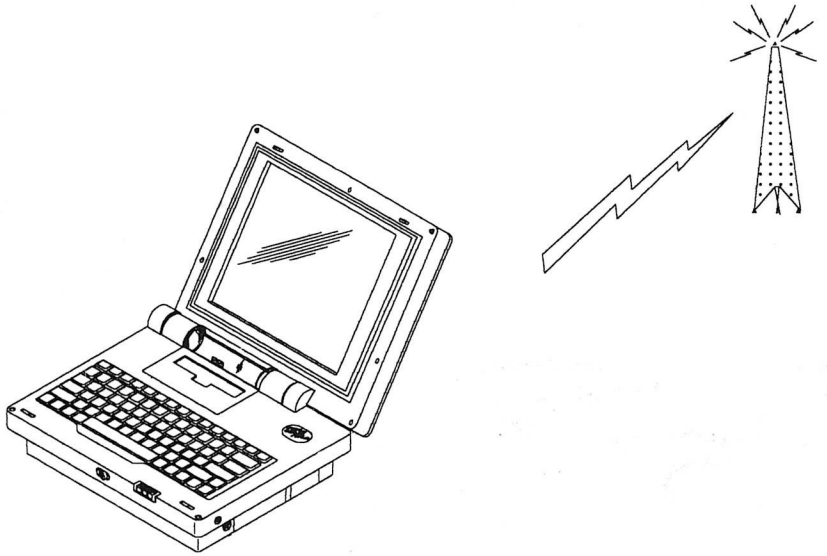
IBM

IBM 9075 PCradio
Guide to Operations

GA12-9043-01



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Note

Before using this information and the product it supports, read the general information under "Other Notices" on page D-5.

Second Edition (July 1992)

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Product Identification

Record the following information:

Type	
Model Number	
Serial Number	

- The product name is on the front of the product above the keyboard.
- The type number is on the bottom of the product.
- The serial number is on the bottom of the product with a prefix of *S/N*.

Preface

This guide shows you how to install, operate, and test the IBM 9075 PCradio system.

How to Use This Guide

- **Chapter 1, "Introduction,"** describes the PCradio system.
- **Chapter 2, "System Setup and Diagnostics,"** explains how to set up the system and run diagnostics.
- **Chapter 3, "Installing Options,"** explains how to handle, install, and replace parts of the unit.
- **Chapter 4, "Porting Applications,"** explains the methods you can use to transfer data from a computer with a diskette drive to the PCradio system.
- **Chapter 5, "Using the Cellular Voice Program,"** explains how to use the Cellular Voice Program to enable use of the cellular modem for voice-only operation.
- **Chapter 6, "Testing the System,"** explains how to test the system and determine problems.
- **Chapter 7, "Maintaining the System,"** explains how to maintain the unit, batteries, and paper.
- **Chapter 8, "Supplies and Accessories,"** describes the supplies and accessories available for the PCradio system.
- **Appendix A, "Using the IC Card Utilities,"** explains how to use the IC Card Utilities.
- **Appendix B, "Using the ICFORMAT Screen,"** explains how to format an IC memory card by using the ICFORMAT screen.
- **Appendix C, "Understanding IC Memory Card"** describes IC memory cards and how DOS uses them.
- **Appendix D, "Product Warranty and Notices"** contains the warranty for the PCradio system, electronic emission notices, and other notices.

Related Publications

The following is a list of associated reference materials:

- *IBM 9075 Hardware Maintenance Library*, SC34-3019
- *IBM 9075 Operating System Command Reference*, GC34-3020
- *IBM 9075 RF Communications Program Development Guide*, SA12-9041
- *IBM 9075 Technical Reference*, SA12-9042

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Chapter 1. Introduction

This chapter describes the IBM* 9075 PCradio* system.

System Description

The PCradio unit is a battery-powered, lightweight system used in mobile and portable applications. It provides host information access from remote locations, enabling mobile workers to be more productive and responsive to their customers. The system can capture and transmit site data, access host data bases, electronic mail or other information, receive online data dispatches and send FAX data.

Service technicians, business travelers, public safety officials, and other professionals who often work outside of their offices can use the PCradio system. For example, service technicians can use the system to order emergency parts or to receive technical repair information. Sales representatives can use it to access product order or delivery status.

The PCradio system is available in three models:

- Model 001 contains a 2400 bits per second (bps) telephone line modem.
- Model 002 contains a 2400 bps telephone line modem and a radio packet modem (806-821 MHz transmit and 851-866 MHz receive).
- Model 003 contains a 2400 bps telephone line modem and a cellular radio modem (824-849 MHz transmit and 869-894 MHz receive).

The system has power management circuitry for power conservation and battery status. Portability features include the fold-down backlit display, and battery chargers for building or vehicle use.

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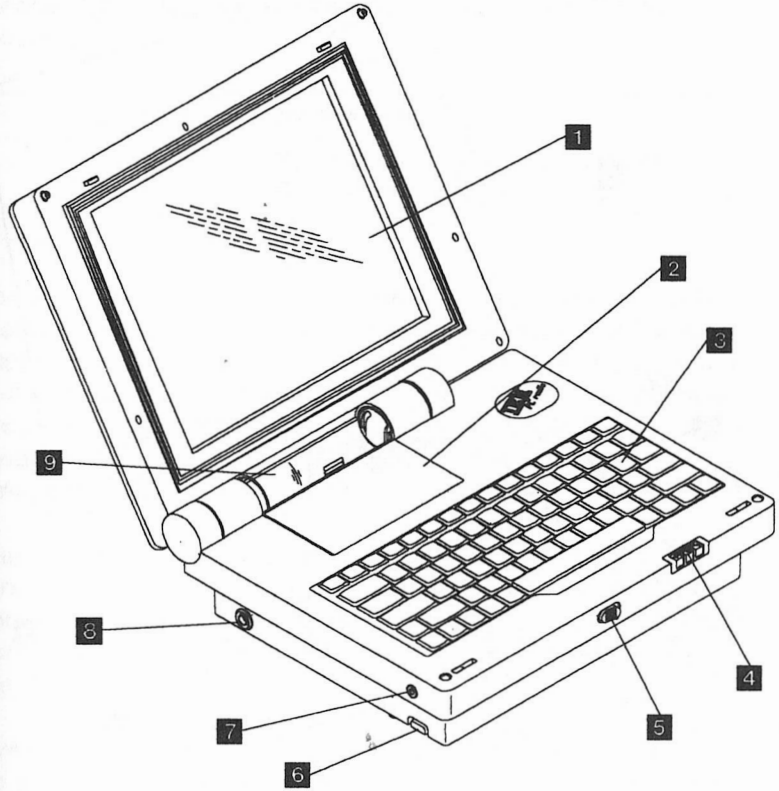
* Trademarks of International Business Machine Corporation.

The system includes the following:

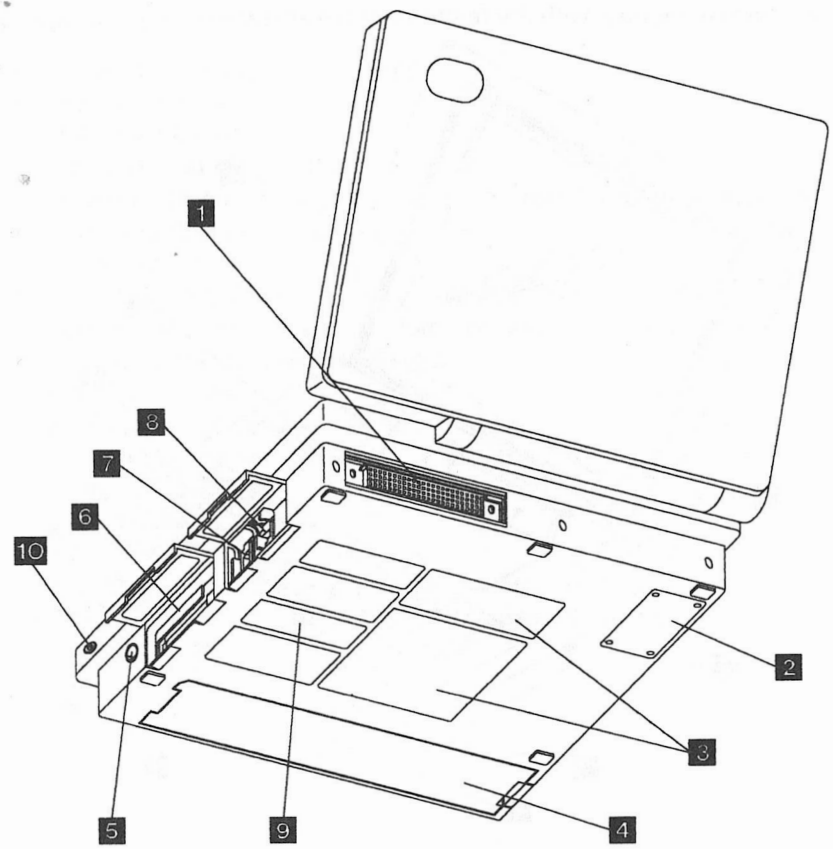
- 80C186 processor (5 or 10 MHz)
- 640KB memory
- 79-key keyboard
- Liquid crystal display (LCD)
- External 104-pin connector (to facilitate serial and parallel ports)
- Rechargeable nickel-cadmium battery
- Battery charger
- Integrated Circuit (IC) memory card slot (drives A and B)
- 124KB unformatted static random access memory (SRAM) drive C
- Read-only memory (ROM) drive D
- Internal antenna
- 2400 bps telephone line modem
- System backup battery
- System status light emitting diodes (LEDs)
- Disk Operating System (DOS)

Several features are available for the system. Refer to Chapter 8, "Features, Accessories and Supplies" on page 8-1 for more information.

Familiarize yourself with the features of the system.



1. Display
2. Printer cover (or blank if printer not installed)
3. Keyboard
4. LED panel
5. Cover latch
6. Rechargeable battery latch
7. Left carrying strap connection (right not shown)
8. External antenna connector
9. Paper cover



1 104-pin connector (I/O door)
2 System backup battery cover
3 Labels
4 Rechargeable battery
5 Battery charger connector
6 IC memory card slot
7 Cellular handset connector (Model 003)
8 RJ11 telephone connector
9 Model/serial number label
10 Right carrying strap connection (left not shown)

Refer to the label containing the system type number and serial number 9 to determine the modem present according to the following table:

Type Number	Modem Type
9075-001	Telephone Line Compatible modem
9075-002	Radio Packet modem
9075-003	Cellular Radio modem

The telephone line compatible modem, which is included with all models, can transmit and receive data using a standard telephone wall jack. You can use use the modem to dial telephone numbers and communicate with other computers by using a communications program. The various bulletin board systems (BBS) use this type of modem. Data is transmitted on a character-by-character (one at a time) basis. This modem can also do FAX transmissions.

Warning: Special telephone services, such as call waiting and call forwarding, may cause random loss of the telephone modem connection when receiving a second call. Contact the telephone service provider for information on how to temporarily bypass these features.

Avertissement: Les fonctions téléphoniques spéciales comme l'appel en attente et le renvoi automatique peuvent provoquer une coupure aléatoire de la liaison modem au moment de la réception d'un deuxième appel sur la ligne en service. Adressez-vous au fournisseur de services téléphoniques cellulaires pour savoir comment désactiver ces fonctions de façon temporaire.

The radio packet modem uses a radio frequency (RF) transmitter to send and receive data with the appropriate application software. This type of modem transmits in packets of data. A packet consists of a variable number of characters that are transmitted serially.

The cellular radio modem has the capability of doing both voice communications and data communications with the appropriate application software. You use a handset similar to that of a telephone for voice communications. This modem can also send FAX data with the appropriate application software.

External Ports

CAUTION:
To reduce the risk of shock hazard, do not use an antenna system connected externally to a building or other high support structure; this impacts personal and property safety, and degrades system performance.

ATTENTION !
Pour réduire tout risque de choc électrique, ne connectez pas votre antenne à l'extérieur d'un bâtiment élevé; cela pourrait avoir un impact sur la sécurité des personnes et des biens et dégraderait les performances du système.

Models 002 and 003 have an *external antenna port* for use with mobile antennas. The port is a coaxial connector within a screw housing.

You can attach a coaxial cable to the unit that is no more than 12 feet long, and that is equipped with a male SMA series radio frequency connector. This may be a slip-on or threaded connector. The company who provides the antenna should install and test it to ensure that system performance is maintained.

The radio packet and cellular radio modems are designed for optimum performance using a low profile antenna system and low power.

The *charger port* is a 4-pin keyed connector. The matching connector of the charger has a locking pin. Refer to "Battery Chargers" on page 8-1 for more information on the chargers.

The *communications ports* are:

- A 104-pin connector, requiring the breakout box feature for direct connection to standard serial and parallel cables.
- A modular jack for the 2400 bps telephone line modem.
- A modular jack for the cellular handset (Model 003).

Activity Monitor Circuit

The activity monitor circuit detects the power requirements of the system. Input from the circuit places the system in the following power saving modes:

- Doze – transparent to the user; usually entered after several seconds of inactivity. In this mode, the processor speed is reduced, the software running is halted for the duration of doze, and the display, keyboard, and other system components remain powered on. The system exits this state with any I/O interrupt. The period of inactivity required to enter this state is programmable through the Setup menu and BIOS.
- Sleep – usually entered after several minutes of inactivity. You can choose settings in the Setup menu and BIOS that indicate to power off the display, display controller, printer, modem, and radio device after several minutes of inactivity. You can also choose to place the keyboard in an inactive power save mode. The system usually enters sleep mode from the doze mode. You can force it into sleep mode from the keyboard (**Func + Sleep**). Press the **Resume** key to exit sleep mode. The system exits this state upon receiving any I/O interrupt.
- Suspend – entered by user request (**Func + F6**), thermal shutdown (65°C/149°F), or low battery shutdown. Suspend preserves the system setup, memory, and processor state.

  Note: You must reinitialize the 2400 bps telephone line modem, radio packet modem, and cellular radio modem following Suspend. These devices lose power during Suspend.

  Press the **Resume** key to exit suspend mode.

System Status

Three LEDs near the keyboard indicate the system status to the user. The LEDs function as follows:

	Orange	System battery currently being charged.
	Off	System not being charged or system is fully charged.
	Green	The radio packet modem is transmitting.
	Yellow	On during POST[1]; flashes when a message is pending.
	Green	Power is on and system is running.
	Green	Flashes when system is in sleep mode.

Keyboard Operation

The keys on the keyboard operate the same as other computer keyboards. Some keys have multiple meanings, as indicated by the white and gray characters printed on the keys.

Some operations require you to press and hold two or three keys. This is indicated by the plus sign (+) between key names. Always press and hold the keys in the order indicated until pressing all keys in the sequence.

Ctrl + **Alt** + **Del** clears system memory and loads the system programs from the system load device.

Function Keys

The **Func** key functions are printed in gray. To use these functions, press the **Func** key and press the key with the desired function, listed in the following table. Once you press the **Func** key, it remains active until you press and release the next key. After you release the second key, you must start the key sequence over.

1 Power On Self Test

Key	Function
Func + PrtScr	Prints the information appearing on the screen.
Func + SysRq	Defined in your operating system or application program manual.
Func + F6 or Func + Suspend	The system enters suspend mode. See page 1-7. Suspend mode is useful when changing batteries because you can skip the initialization time at power up. Press the On key to resume operation.
Func + F9	Turns backlight on or off.
Func + F10	Decreases screen contrast. Contrast control cycles until you release F10. When the F10 key is released, the key sequence must be started over. The cycle speed of the contrast control is determined by the **Keyboard Rate** set in the Setup menu.
Func + F11	Increases screen contrast. Contrast control cycles until you release F10. When the F11 key is released, the key sequence must be started over. The cycle speed of the contrast control is determined by the **Keyboard Rate** set in the Setup menu.
Func + F12	Enters sleep mode. Sleep mode limits power to the system as selected on the Setup screen.
Func + ScrLk	Defined in your operating system or application program manual.
Func + numeric keypad keys	Activates the number printed in white on that key. See "Numeric Keypad" on page 1-10.
Func + cursor keys	Activates the function printed in gray on that key. See "Cursor Keys" on page 1-10.
Func + Off	Powers off the system.

The **Suspend** and **Resume** keys provide a way to temporarily interrupt work. Press the **Suspend** key to improve battery life by suspending the system, rather than leaving the system on when it is idle for long periods. Press the **Resume** key to return to normal operation.

Note: You must reinitialize the 2400 bps telephone line modem, radio packet modem, and cellular radio modem following Suspend. These devices lose power during Suspend mode.

Cursor Keys

The four arrow keys at the lower right corner of the keyboard control the cursor movement.

Key	Description
Func + ←	(Home) Cursor returns to far left on the same line.
Func + →	(End) Cursor returns to the end of the same line.
Func + ↑	(PgUp) Cursor scrolls up one page.
Func + ↓	(PgDn) Cursor scrolls down one page.

Numeric Keypad

The numeric keypad provides a calculator-like pad for entering numbers. It includes the numbers and operators (-, /, and *) labeled in white on the keyboard. Press **Func + NumLk** to turn the numeric keypad on and off.

IC Memory Cards

Integrated Circuit (IC) memory cards are available as optional features. They are similar to floppy diskettes and fixed disk drives in many respects, including their use. All these devices can store and retrieve data, and you need to format all before storing data. The most noticeable difference is that the IC memory card is credit-card sized. You can use an IC memory card in applications where reduced power consumption, compact size, and low weight are required.

Access times to data on IC memory cards is significantly faster than to data on a fixed disk drive because there are no mechanical parts to move to locate data. Additionally, the memory cards are not as susceptible to handling damage as are other storage devices. Shock and vibration have little effect, and many common types of spills have no effect.

The IC memory card plugs into the IC memory card slot on the system. You can use an IBM-supplied IC memory card listed in "Part Numbers and Feature Numbers" on page 8-3 or equivalent.

Note: You must format the IC memory card before using it.

The following types of IC memory cards are available from IBM:

SRAM Static Random-Access Memory (SRAM) allows data to be written to and erased from storage. IC memory cards using SRAM require a battery source to maintain the data once you remove the card from the system.

Note: You must back up an SRAM IC memory card at least once a week to avoid losing data.

Flash Flash Electrically Programmable Read Only Memory can retain data without the need of a battery or other power source. This memory can be electrically erased, which allows the computer to write data to and erase data from the card. However, the computer must erase the entire card before it can write data to it.

Combination A combination IC memory card has both SRAM and Flash on it.

SRAM and combination cards have a backup battery to preserve the programs and data.

Two of the external features of the SRAM IC memory cards are the write protect switch and the battery. You can set the write protect switch to protect data from erasure without removing the card from the system. You should only replace the backup battery when the card is in the system.

Battery life, which varies according to the size of the IC memory card, can be from 6 months to 5 years. However, if you use or store the battery outside its operating temperature range of 0°C to 60°C (32°F to 140°F), you may reduce the useful battery life to two months or less.

Refer to "Part Numbers and Feature Numbers" on page 8-3 for information on ordering an IC memory card.

Drives

The drives in the system are different than traditional drives in PCs. The configuration information of the IC memory card determines drives A and B.

Drive C is a 124KB[2] SRAM device on the system board that is preserved by the system backup battery.

Drive D is the system board ROM. It is the primary, initial program load (IPL) device, and contains diagnostics, radio personalization, and system setup programs.

[2] US and Canada only.

Battery Usage Tips

The types of batteries that come with your system are:

- Rechargeable battery. This is the power source for your system. One battery comes with your unit. You can order additional batteries.
- System backup battery. This battery preserves drive C (124KB SRAM on the system board).

A phenomenon called *memory effect* may occur in your rechargeable battery if you do not properly charge it. Memory effect may occur if you use the battery in a manner that gradually limits the ability of the battery to deliver its full capacity to the system. If you follow the procedures described below, you will avoid memory effect.

Charging and Recharging the Battery

The life of the rechargeable battery depends on how you use the system and how you recharge the battery. To get the maximum battery use, do the following:

- Initial Use: The battery that is shipped with the system is fully discharged. Charge the new battery for 12 hours before initial use.

  Notes:

  1. The charging indicator on the system initially comes on when battery charging begins and goes off after approximately 6 hours. **Do not** stop charging until 12 hours have elapsed. Otherwise, you will shorten the life of the battery.
  2. The capacity of the battery will be maximized after 3 to 5 charge/discharge cycles.

- Operating Use:

  Low-Battery Warning Recharge the battery for at least 6 hours. When the charging indicator goes off, the battery is 75% charged; continue charging 6 more hours to reach 100%.

No Low-Battery Warning You should fully discharge the battery at least once a month and then recharge it to attain the longest battery life.

Recharging Aging Batteries

After many recharges using the procedure in "Charging and Recharging the Battery" on page 1-13, you may not be able to discharge the battery fully. When this happens, use the following procedure to get the maximum capacity from the rechargeable battery.

1. When the charging indicator comes on, power off the system for five minutes.
2. Power on the system and wait until the system powers off itself.
3. Repeat step 2 three or four times.

   Note: Performing the first three steps completely discharges the battery pack.
4. Charge the battery pack for at least 6 hours. If you cannot charge the battery to the required voltage, replace it with a new battery.

Other Battery Usage Tips

The system functions that consume the most power are:

- Use of the backlight function
- Use of any modem to transmit (send) data, FAX, or voice calls
- Use of the internal printer

To conserve battery power, use these functions only when required. Selecting the proper parameters during system setup also helps to maximize battery life.

When storing the unit, store it with the rechargeable battery installed and fully charged. Recharge the battery every 3 to 6 months to prolong the battery life.

When replacing the system backup battery, make sure the rechargeable battery is installed.

Chapter 2. System Setup and Diagnostics

This chapter tells you how to do the following:

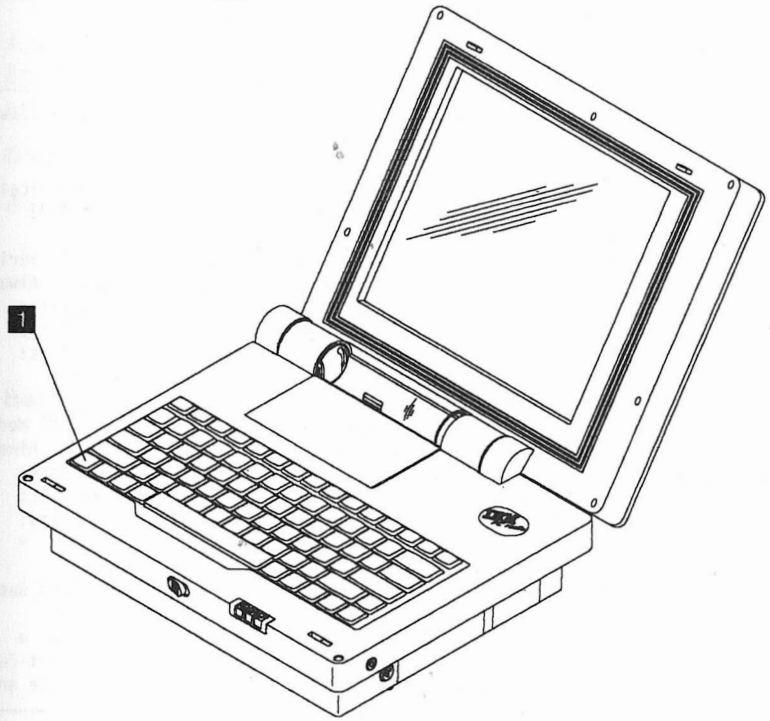
- Set up the system
- Run the Radio Personalization Program
- Format your IC memory card
- Perform a system checkout

Note: You will have different screens than the ones shown in this manual if you have version 1.00 diagnostics.

System Setup

Perform the following steps to specify the system parameters and test the system.

1 Press the **On** key 1.



Note: For the initial power on, you may need to improve the contrast of the display.

2 Adjust the display contrast; press and hold **Func+F11** to increase and **Func+F10** to decrease the contrast.

3 Observe the memory size incremented in the top left corner of the screen (it should reach 640KB); this is part of the power-on self-test (POST). The LED should be yellow during the POST. The system beeps when finished testing (approximately 10 seconds).

If you have an indication of a problem, such as a display not working, go to "Troubleshooting Charts" on page 6-5.

Note: If you do not use the system for an extended period of time, the display may become blank because the system default for the display is sleep mode. In this case, press **Resume** key to bring back the display.

4 The System Setup menu appears automatically the first time you power on the system. If it does not appear, press **Alt+Func+F1**.

```
========================== SYSTEM SETUP MENU ==========================
                           IBM 9075 PCradio™

----------Clock----------  -System Power Management-  --Communications--
Time:            12:00:00  CPU Speed:          Fast  COM2/COM3   Normal
Date: Tue  January 1,1991  Doze Timeout (sec):    5
Alarm Turn On Time:   Off  Sleep Timeout (min):   2  ---COM1 Serial----
                           Suspend Timeout (min): 1  Power:  Always Off
----------Display---------  Alarm Trigger:     LOWB2  Baud Rate:    2400
Power:             Sleeps  Alarm Type:       WINDOW  Data Bits:       8
Backlight Power:   Sleeps  Alarm Interval (min):  2  Stop Bits:       1
Screen:    Black on White                            Parity:       None
Video Activity Monitor: On --------Keyboard--------
                           Power:             Sleeps  ----COM2 Modem----
----------Printer---------  Key Click:            On  Power:  Always Off
Power:             Sleeps  Delay (msec):        500  Baud Rate:    2400
Character Darkness:   128  Rate (/sec):        10.0  Data Bits:       8
                                                      Stop Bits:       1
------Drive Selection-----  ------------------------  Parity:       None
Load DOS From:         ROM  Backup Battery Life    0
Resident Diagnostics:  Off                            ----COM3 Radio----
                                                      Power:          On

1. Position Cursor       2. Press Spacebar, +, -    3. Press Alt-Func-F1
   using Keypad Arrows      to Change                  to Update and Exit
```


5 To change the Setup menu parameters:

- Use the arrow keys to move the cursor to the value you want to change. The Tab key moves the cursor between headings such as Display and Printer.
- Use the Spacebar, or + and − keys to change the values.
- Press **Alt+Func+F1** to save the changes and exit.

To return to the default values of the Setup menu, press **F1**. To exit the Setup menu, press **Esc**; changes are not saved.

The Setup parameters are described below.

Clock

Time: HH:MM:SS

You can change the month, day, and year. Day of the week changes automatically with the day (number).

Note: You can also change the time and date by using the DOS time and date commands.

Alarm/Turn On Time: HH:MM:SS or Off (default). Use the Spacebar to turn alarm on or off. Use +, −, and → to set the alarm value.

Display

Power:

- Always On − power is always on.
- Sleeps (default) − screen is blanked to save power after a delay defined by System Power Management (described later).

Backlight power:

- Always On − the backlight is on when the system is running, and off when the system is in sleep mode. Choosing this option increases power consumption.
- Sleeps (default) − the backlight is on when the system is on and you are using the keyboard. After one minute of keyboard inactivity, the backlight power turns off.
- Always Off − the backlight is off.

Note: To maximize the battery life, set Backlight power to Always Off and turn on the backlight power by pressing the **Func+F9** keys when the environment requires it.

Screen:

- Black on White (default) – black characters on a white background.
- White on Black – white characters on a black background.

Video Activity Monitor:

- On (default) – detects changes on the screen (like a clock program) and prevents sleep mode. If you have a program loaded that writes to the screen, you may want to set this parameter to On.
- Off – ignores screen changes (like a clock program) and lets the system go to sleep mode.

Note: To maximize the battery life, set Video Activity Monitor to Off.

Printer

Power:

- On – printer power is always on.
- Sleeps (default) – printer is off when the system enters sleep mode after a delay defined by System Power Management.
- Off – printer power is off.

Note: To maximize the battery life, set Power to Off. Note that the printer does not consume much power when not printing.

Character Darkness: 0 to 255 (default=20). 0 is the darkest setting. See "Testing the Internal Printer" on page 6-8 to run a printer test from the Setup menu.

Drive Selection

Load DOS from:

- Card – the IC memory card drive A.
- ROM (default) – the internal ROM drive D.

Resident Diagnostics:

- On – system starts IBM diagnostics.

- Off (default) – DOS loads from Card or ROM.

System Power Management

CPU Speed:

- Fast (default) – 10 MHz (increases power consumption).
- Slow – 5 MHz.

Doze Timeout (sec): 0 to 255 (default=5) for the time delay before entering the doze power mode. A value of 0 disables doze and sleep.

Sleep Timeout (min): 0 to 255 (default=2) for the number of minutes the system waits before starting sleep mode. A value of 0 disables sleep.

Note: You should not set this parameter to less than 5 because some applications may time out.

Suspend Timeout (min): 0 to 255 (default=1) for the number of minutes the system waits before starting suspend mode after detecting LOWB2. If you do not want suspend mode to start, type 0 in this parameter.

Alarm Trigger:

- LOWB1 – a message appears when the battery reaches 7.1 volts, warning you to save the data and charge or replace the battery. The message appears as often as the repeat setting of the Setup menu.
- LOWB2 (default) – a message appears when the battery reaches 6.7 volts, warning you to save the data and charge or replace the battery. The message appears as often as the repeat setting of the Setup menu.
- LOWB1+LOWB2 – displays the warning messages at both LOWB1 and LOWB2 voltage levels.

Alarm Type:

- DISABLED – no warning appears.
- WINDOW (default) – a warning message window appears on the screen, and four beeps sound. (Press a key to remove the window; press another key to continue.)
- LINE – a one-line warning appears at the top right of the screen, and four beeps sound.
- BEEP – an audio warning of four beeps.

Alarm Interval (min): 1 to 255 (default=2) for the number of minutes between alarms. 0 means that the alarm sounds only once.

Keyboard

Power:

- Always On – the keyboard is always powered on to receive input.
- Sleeps (default) – the keyboard (except the **Resume** key) becomes inactive after a delay defined by System Power Management. Pressing the **Resume** key ends sleep mode.

Key Click:

- On (default) – clicks when you press any key.
- Off – no clicks when you press any key.

Note: Key click operation can affect asynchronous communications.

Delay (msec): 250 to 1000 (default=500) the number of milliseconds between pressing the key and switching to typematic mode.

Rate (/sec): 2 to 30 (default=10.0) controls the rate at which typematic information appears; a higher number is a faster rate.

Note: A faster rate makes adjusting the contrast more difficult.

Backup Battery Life

Backup Battery Life (mo): 0 to 12 months of remaining battery life. Provides a reminder that the battery should be replaced. Twelve months is the life expectancy for a new battery. Use + or – to change the value. Press **Enter** twice to set the monthly value. See "System Backup Battery Warning" on page 3-1.

Note: You must set this value and the system date correctly in order for the reminder to display at the proper time.

Communications

COM2/COM3:

- Normal (default) –the telephone modem address is COM2 (2F8H) using IRQ3; radio device address is COM3 (3220) using IRQ2.
- Swapped – swaps the addresses and interrupts.

COM1 Serial

Power:

- Always On – the external drivers are always powered on.
- Sleeps – the power turns off after a delay defined by System Power Management. The external drivers are powered off in sleep mode.
- Always Off (default) – removes power from the port, disabling it always.

Baud Rate: 110 to 19.2K bps (default=2400)

Data Bits: 7 or 8 (default=8), depending on protocol

Stop Bits: 1 or 2 (default=1)

Parity: None, Odd, or Even (default=None)

COM2 Modem

Power:

- Always On – powers the device regardless of activity.
- Sleeps – the device powers off after a delay defined by System Power Management.

  Note: During sleep mode, you will lose your application-defined modem setup information and you will need to reinitialize your modem after you power on.
- Always Off (default) – powers off the modem regardless of activity.

Baud Rate: 110 to 9600 bps (default=2400)

Data Bits: 7 or 8 (default=8), depending on protocol

Stop Bits: 1 or 2 (default=2)

Parity: None, Odd, or Even (default=None)

COM3 Radio

Power:

- Always On (default) – powers the device regardless of activity
- Sleeps – the device powers off after a delay defined by System Power Management.

Note: During sleep mode, you will lose your application-defined modem setup information and you will need to reinitialize your modem after you power on.

- Always Off — powers off the device, regardless of activity.

6 After you have made your desired changes on the System Setup menu, continue with "Running Diagnostics" if you want to test the system.

Running Diagnostics

This section describes how to run diagnostics to test the system and how to do radio modem personalization. You must run the Radio Modem Personalization program before using your modem.

1 On the System Setup menu, place the cursor at **Resident Diagnostics** and change the value to **On**.

2 Press **Alt+Func+F1**.

3 Press **Enter** to restart the system. POST runs and the memory test appears in the top left corner of the screen.

4 When the IBM logo screen appears, press **Enter**. The Diagnostics menu appears.

```
IBM 9075 PCradio
DIAGNOSTICS
Version 1.10

(c) Copyright IBM Corporation, 1981, 1992


SELECT AN OPTION

0 - SYSTEM CHECKOUT
1 - IC CARD UTILITIES
2 - RADIO MODEM PERSONALIZATION


9 - END DIAGNOSTICS

Select a Number and Press ENTER
?
```


Note: This screen is for version 1.10 of diagnostics. Version 1.00 has a different screen.

5 If you do not want to run a system checkout, proceed with 1 on page 2-11 to run the Radio Modem Personalization program.

6 Select **0 - System Checkout** and press **Enter**.

If you receive an error message, find the error in the "Troubleshooting Charts" on page 6-5 and take the action listed.

The Installed Devices screen appears, similar to the following:

```
THE INSTALLED DEVICES ARE

 1 - SYSTEM UNIT
 2 -   640KB MEMORY
 3 - KEYBOARD
 5 - DISPLAY
 6 - IC MEMORY CARD DRIVE
 9 - PARALLEL PORT
11 - SERIAL PORT
12 - INTERNAL MODEM
16 - RF PORT
17 - INTERNAL PRINTER


IS THE LIST CORRECT (Y/N)
?
```

7 Verify that the list on your screen is correct. Model 001 also includes the RADIO PACKET MODEM and Model 002 includes the CELLULAR RADIO MODEM. Is the list correct?

Yes Press **Y** and press **Enter**. The system test begins.

No Follow the prompts to add or delete devices. Then press **Enter** to test the system.

The system tests the devices in the same sequence in which they appear on the Installed Devices screen. Follow the screen prompts for each test. All tests are numbered. Note any error messages. If you receive an error message, find the error in the "Troubleshooting Charts" on page 6-5 and take the action listed. Insert an IC memory card when the system prompts you to enter the card. Refer to "Using the IC Memory Card" on page 2-16 for IBM card insertion and removal instructions.

Note: If you do not have an IC memory card, ignore the error message that appears and press Enter to bypass the error.

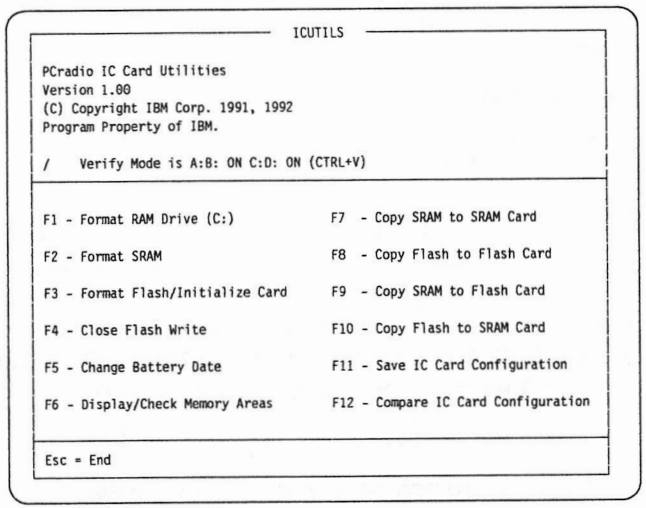
8 When all tests have completed, the Diagnostics menu appears. If you have an IC memory card, continue with the next section; otherwise, continue with "Radio Modem Personalization" on page 2-11.

IC Memory Card Utilities

You need to format the IC memory card for test purposes by running the ICUTILS program as follows:

1 Type **1** on the Diagnostics menu and press **Enter** to begin the IC Card Utilities program.

The ICUTILS screen appears.


ICUTILS
PCradio IC Card Utilities
Version 1.00
(C) Copyright IBM Corp. 1991, 1992
Program Property of IBM.
/ Verify Mode is A:B: ON C:D: ON (CTRL+V)
F1 - Format RAM Drive (C:)
F2 - Format SRAM
F3 - Format Flash/Initialize Card
F4 - Close Flash Write
F5 - Change Battery Date
F6 - Display/Check Memory Areas
F7 - Copy SRAM to SRAM Card
F8 - Copy Flash to Flash Card
F9 - Copy SRAM to Flash Card
F10 - Copy Flash to SRAM Card
F11 - Save IC Card Configuration
F12 - Compare IC Card Configuration
Esc = End

2 Do you have data that you want to save on your IC memory card?

Yes Use one of the copy functions to save the data onto another IC memory card and then continue with the next step. Refer to Appendix A, "Using the IC Card Utilities" on page A-1 for a complete description of the functions on the ICUTILS screen.

No Continue with the next step.

3 Press **F1** to format DASD (C:) on the system.

4 Press **F3** to initialize an IC memory card for test purposes. You must format an IC memory card prior to storing data on the card. Part of the formatting process consists of writing certain information about the card memory into the memory area. If asked to use the existing format, answer **No**.

5 Verify that the memory size displayed matches the memory size of your IC memory card. If not, contact your IBM Service Representative. Press **Enter** to continue.

6 If you have a combination card, assign the SRAM as drive A: when prompted to select A or B.

7 Press **F4** to complete the formatting of the IC memory card.

8 Press **F6** to display the location and a brief status of the available memory areas. If a memory area is available but not formatted, a `Not Formatted For DOS` message appears. This may also indicate the memory area is other than a computer memory card, that is, the card may be designed for a video cassette recorder (VCR) or similar device. If you receive an error message, contact your IBM Service Representative.

9 Press **Esc** to exit the ICUTILS screen and display the Diagnostics screen.

10 Continue with the next section.

Radio Modem Personalization

You need to run the Radio Modem Personalization program to initialize your radio packet or cellular radio modem as follows:

1 Type **2** on the Diagnostics screen, then press **Enter** to begin the Radio Modem Personalization program.

2 Refer to the appropriate section that follows depending on whether you have a radio packet modem or cellular radio modem.

Radio Packet Modem

If you have a Radio Packet Modem (RPM) with release level 1 firmware, the following screen appears:

```
Radio Packet Modem has release level 1 software  (PID = XXXX).
To have the channel changed, contact your Marketing Representative.

Press F3 to exit the program.
```

If you have an RPM with release level 2 firmware or later, the following screen appears:

```
Primary ID          : A1B1
Channel Tx Frequency : 810.0250
Channel Selected    : 01

Is the Channel information Correct? (y/n)

Press F3 to quit.
```

Depending on the RPM modem configuration, a Secondary ID (SID) may appear. If the information presented is not the same as the information obtained from ARDIS, type **n** and press **Enter**. A screen appears that allows changes to the information. Type the desired changes, and press **Enter** to save the changes.

Primary ID (PID) This number is the 4-digit identification number of the modem. The modem supplier enters it at the time of manufacture. You cannot change this number.

Secondary ID (SID) This number is an 8-digit identification number that displays if the modem is configured to use the SID. It is set by manufacturing and cannot be changed.

Channel Frequency This is the frequency, in megahertz (MHz), used to transmit data.

Channel Selector This is the pointer to the channel frequency used for communications.

Changing the Channel Selector will set the Channel Frequency. Your network provider supplies the information that you need to enter.

After saving any changes, DOS loads from the device selected on the Setup menu before you entered diagnostic mode. If you have an SRAM or combination IC memory card or C drive, format the IC memory card as described in Appendix B, "Using the ICFORMAT Screen" on page B-1.

Cellular Radio Modem

If you have a cellular radio modem installed, the following screen appears:

```
                    Enter Cellular Modem Information

ESN:  01234567890
                                Number Assignment Modules
                              ┌── NAM 1 ──┬── NAM 2 ──┐
Dual NAM (y/n)                │           │           │
Phone Number (MIN)            │           │           │
System ID (SID)               │           │           │
Group ID (GID)                │           │           │
Overload class (OLC)          │           │           │
Access Channel (IPCH)         │           │           │
System Selection              │           │           │
                              └───────────┴───────────┘

↑ ↓ - Move cursor between lines
Tab - Move cursor between NAM 1 and NAM 2
F8  - Save NAM data in the modem
F10 - Toggle the active NAM (NAM 1 or NAM 2)
F3  - Exit

──────────────────────────────────────────────────────────────────────
Help and Informational messages appear on this line.
──────────────────────────────────────────────────────────────────────

SystemA   = y  SystemB  = n   Roam   = n  InUse  = n  Active NAM = 01
NoService = n  Channel  = 313 Ready  = y  RSSI   = 12 (voice and data)
```

The Number Assignment Module (NAM) consists of the telephone number and other information. If the NAM information presented is not the same as the information obtained from your network provider,

move the cursor to the selected field to change the information. Press **F8** to save the NAM data. Then, if you have Dual NAM set to *y*, press **F10** to select the active NAM. You can change this information anytime a call is not in progress.

Call your network provider for the following information:

- Group ID
- Access Channel

Help and informational messages for each field appear in the area indicated. Follow the screen instructions to change and then save the information. The system reinitializes using the information entered.

ESN The Electronic Serial Number (ESN) is the identification number of the cellular radio modem. The modem manufacturer enters the number and you cannot change it.

Dual NAM The Number Assignment Module (NAM) consists of the telephone number and other information, which identifies the cellular phone. If you have two communications network telephone numbers, type **Y** in this field.

Phone Number The Phone Number (NIM) is used for incoming and outgoing calls on the communications network. If you selected dual NAM, you can type your second telephone number in the NAM 2 column.

System ID The System ID (SID) is the identification number of your network provider.

Group ID The Group ID (GID) is assigned by your network provider.

Overload Class The Overload Class (OLC) is assigned by your network provider. The OLC allocates communications usage during heavy network traffic. Although the information is required, a priority allocation system is not currently in use.

Access Channel The Access Channel (IPCH) is related to the System ID. The Access Channel is the frequency band assigned by the network provider.

System Selection The System Selection allows you to select the primary system to use if you have two service providers.

- A only — Use system A only.
- B only — Use system B only.
- Prefer A — Use system A primarily, and system B secondarily.
- Prefer B — Use system B primarily, and system A secondarily.

The information appearing on the last two lines of the Cellular Modem Setup screen is the current modem status. The following is a description of the status:

System Indicates the current network provider selected, either provider A or provider B. Network provider A is the non-wire line provider, and network provider B is the wire line provider.

Roam Is a service of the network provider who can supply information on its function.

InUse Indicates if the modem is either sending or receiving data.

Active NAM Indicates which phone number you selected by pressing F10. You can change the Active NAM between calls.

NoService Is the status of the connection to the host network. If this equals N, network service is available to you.

Channel Indicates the channel number on which you are operating.

Ready Indicates the system can transmit and receive data.

RSSI Received Signal Strength Indicator—Indicates the relative strength of the incoming radio signal. A 0 = no incoming signal detected, 15 = maximum signal strength. You should have a minimum RSSI of 4 for voice operation, and 7 for data.

Press **F3** to exit the screen. DOS loads from the device selected on the Setup menu before you entered diagnostic mode.

If you have an SRAM or combination IC memory card or C drive, format the IC memory card as described in Appendix B, "Using the ICFORMAT Screen" on page B-1.

Using the IC Memory Card

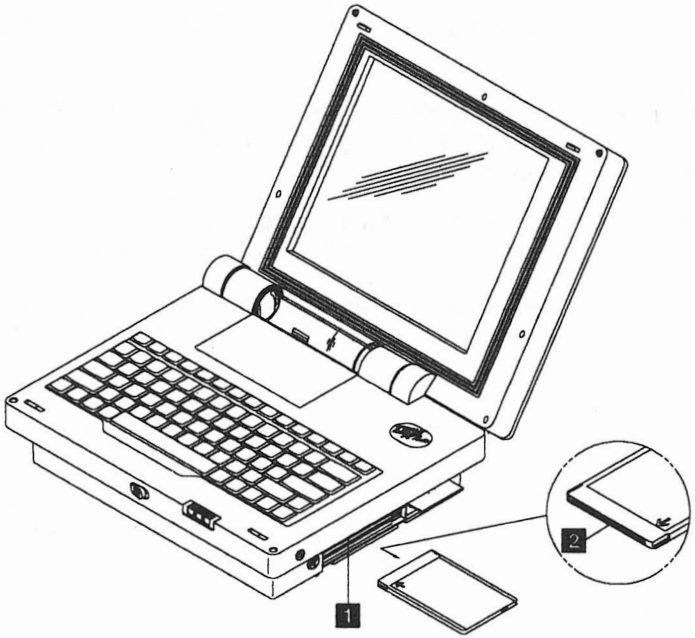
This section describes how to insert and remove the IC memory card in the unit, and how to replace the battery in the IC memory card.

Inserting the IC Memory Card

To insert an IC memory card, do the following:

1 Lift the IC memory card door 1.

2 Slide the card into the slot with the connector 2 inserted first and the arrow on the top of the card as shown below. Verify that you have securely inserted the IC memory card.



3 Close the IC memory card door.

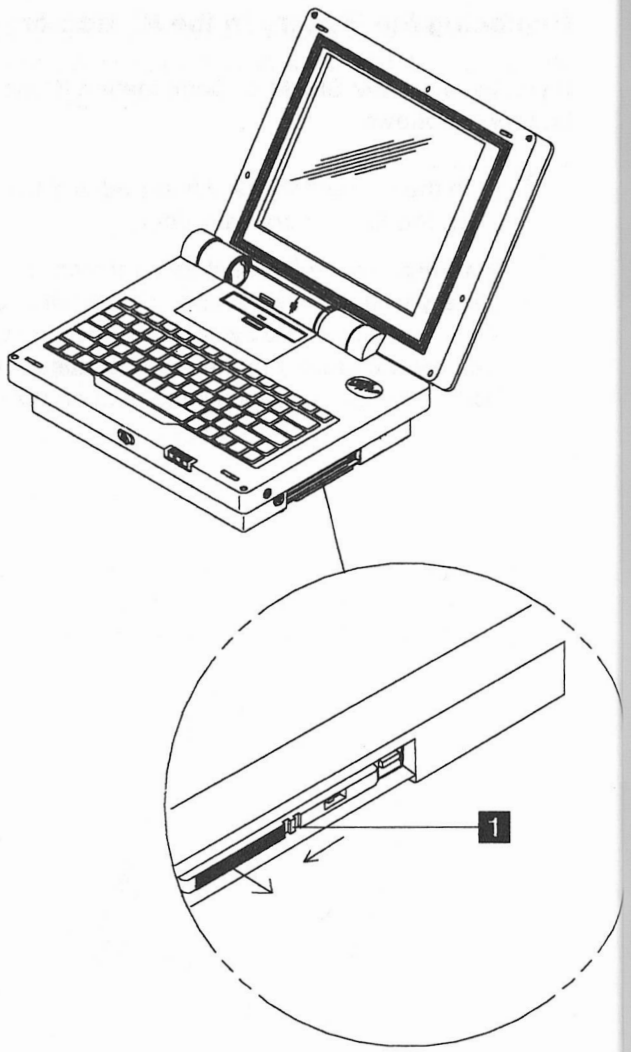
Replacing the Battery in the IC Memory Card

If you have an IBM SRAM or Combination IC memory card, install the battery as follows:

1 With the IC memory card inserted and the system power on, open the IC memory card door.

Warning: You will lose data on the card if you remove the battery from the card with the card removed from the system. Also, make sure the system battery is installed when you replace the battery in the card because the system backup battery temporarily saves the data on the card.

2 Press the battery holder latch 1 as shown and carefully remove the battery holder from the card.

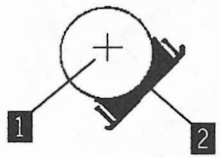


3 Remove the battery from the battery holder and properly dispose of the battery.

CAUTION:
Dispose of used batteries promptly. Keep away from children.

ATTENTION !
Mettez rapidement au rebut les piles usagées. Gardez les piles hors de portée des enfants.

4 Insert the new battery 1 in the battery holder 2 with the positive side up.

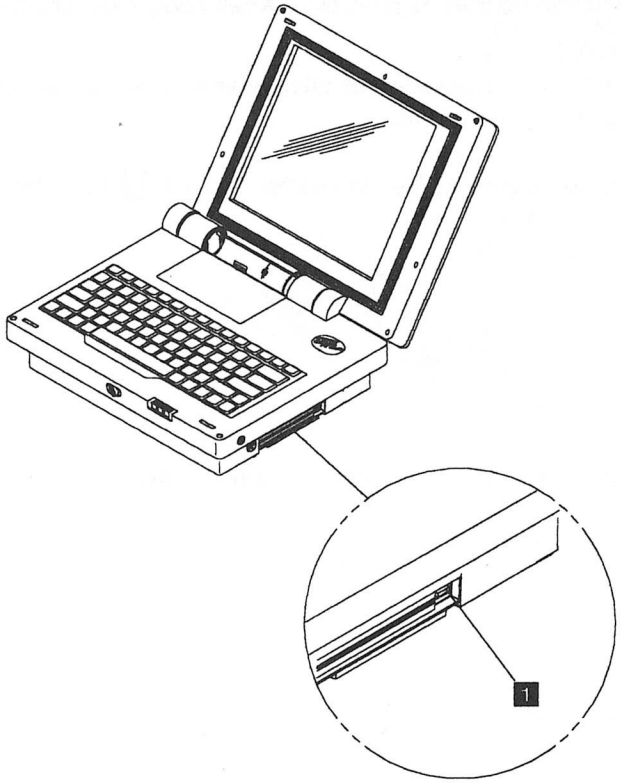


5 Insert the battery holder into the IC memory card.

6 Close the IC memory card door.

Removing the IC Memory Card

To remove the IC memory card, push the button 1. Place your fingers along the sides of the card and slide it out.



Restarting the System

To restart your system, perform **one** of the following:

- If the system is on, press and hold **Ctrl+Alt+Del**; then release them.
- Press the **Func+Off** keys, and then press the **On** key.

The POST runs, and the resident operating system loads. You are now ready to run application programs.

Chapter 3. Installing Options

The following procedures explain how to handle, install, and replace parts of the PCradio system.

IC Memory Card Battery Warning

If the IC memory card is accessed and the battery is low or dead, the following warnings appear:

```
IC CARD LOW BATTERY
Press any key:
```

```
IC CARD BATTERY DEAD
Press any key:
```

Whenever the system loads or accesses the IC memory card for the first time, the system checks the the expiration date. The following message appears if the battery date of the IC memory card expires:

```
                    WARNING
The IC memory card battery expired on xx-xx-xx.
      Replace the battery or data may be lost!
Enter the new expiration date if battery has been changed,
              or press Enter to continue.
```

System Backup Battery Warning

When you power on the system from the off state or resume power after Suspend mode, the system checks the system backup battery replacement date. The following message appears if the battery date expires:

```
                    WARNING
The System Backup battery expiration date has expired.
Replace the battery and update the expiration date or data
 may be lost!  Please refer to the Guide to Operations
              for proper replacement procedure.
                Press any key to continue.
```

Replacing the System Backup Battery

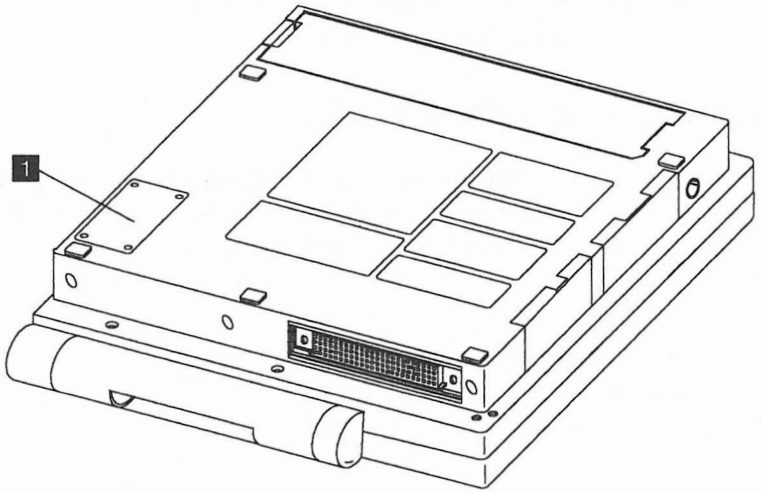
CAUTION:
Replace the system backup battery with IBM part number 89F5162 only. Use of another battery may present a risk of fire or explosion. Do not recharge, disassemble, or dispose of in fire.

ATTENTION !
Pour remplacer la pile de secours au lithium, commandez une pile de rechange portant la référence IBM 89F5162. Toute autre pile risquerait de prendre feu ou d'exploser. Ne rechargez pas la pile, ne la démontez pas, ne la brûlez pas.

Warning: A charged rechargeable battery must be installed before continuing so that you do not lose your system setup information and your C drive.

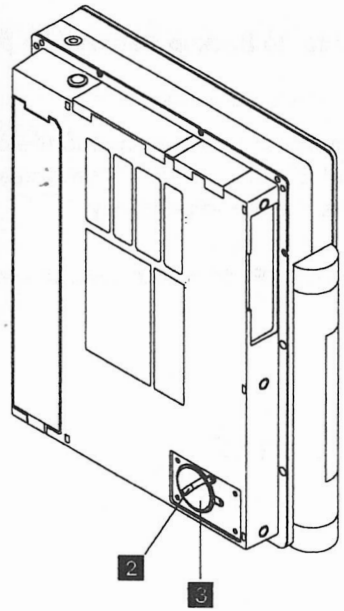
Avertissement : Avant de continuer, installez une batterie rechargeable afin de ne pas perdre les données de configuration de votre système.

1 With the power off, place the system unit upside down as shown.



2 Remove the 4 screws that secure the battery cover 1 .

3 While holding the unit on its side as shown, lift the top contact 2 and gently remove the battery 3 .



4 Dispose of the battery as required by local ordinances or regulations.

CAUTION:
The lithium in the system backup battery is a hazardous material. The cadmium in the rechargeable battery is a toxic material. Both of these batteries should be disposed of according to local, state, and federal regulations.

ATTENTION !
Le lithium contenu dans la pile est un produit dangereux, et le cadmium contenu dans la batterie Ni-Cad est un produit toxique. Pour la mise au rebut, reportez-vous à la réglementation en vigueur.

5 Place the new battery 2 under the top contact 3 with the positive (+) side down.

6 Secure the battery cover with the 4 screws.

7 Power on the system and press **Alt** + **Func** + **F1** to access the Setup menu.

8 Move the cursor to **Backup Battery Life** parameter and press **Enter** twice.

9 Change the number to the expected life of your battery (the life expectancy of a new battery is 12 months). If your battery is not new, estimate the life expectancy.

10 Press **Alt** + **Func** + **F1** to exit the Setup menu. Follow the screen prompt.

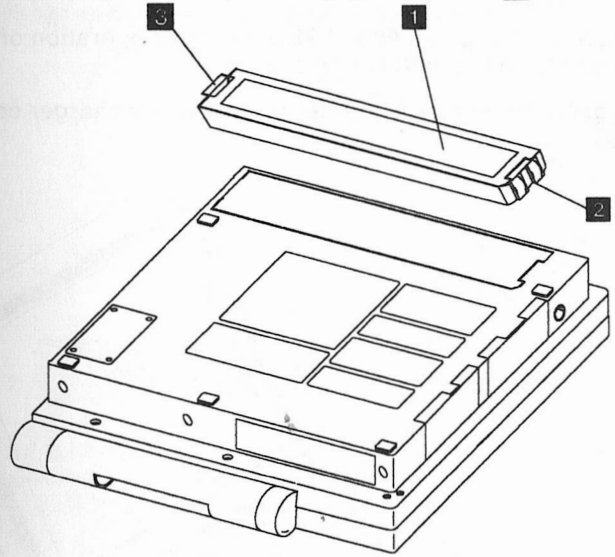
Installing the Rechargeable Battery

Notes:

1. The system will not power on with the rechargeable battery removed.
2. Extended absence of the rechargeable battery reduces the life of the system backup battery.

1 Insert the end of the rechargeable battery 1 with the contacts 2 into the bottom of the system unit.

2 Press the opposite end of the rechargeable battery into the bottom of the system unit, and engage the latch 3.



Rechargeable Battery Warning

You should recharge the rechargeable battery when low battery signals (beep, window message, or line message) occur. When the system senses low battery voltage, it displays a window message (if selected in the Setup menu):

```
Level 2

Low Battery Alarm!

Press Any Key:
```

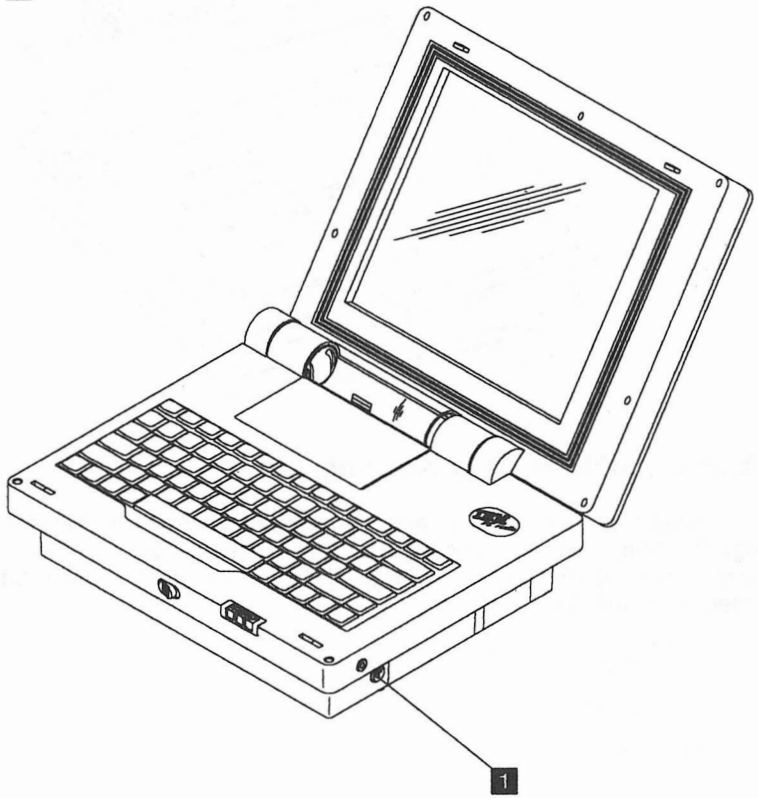
If the battery is removed and replaced while the system is on, press the **On** key a second time to resume operating the system.

Recharging the Rechargeable Battery

Warning: The use of unapproved battery chargers or external power supplies can cause serious damage to the system unit. Use only the battery charger supplied with the system.

Avertissement : L'utilisation de chargeurs de batterie non homologués ou d'unités d'alimentation externes peut gravement endommager le système. N'utilisez que le chargeur de batterie fournis avec l'unité centrale.

1. Exit the application. If the application can reinitialize the settings of the radio and communications ports, you can leave the system running.
2. Power off or press **Func** + **F6** to suspend operation of the system, so the battery can charge.
3. Connect the battery charger to the battery charger connector 1.



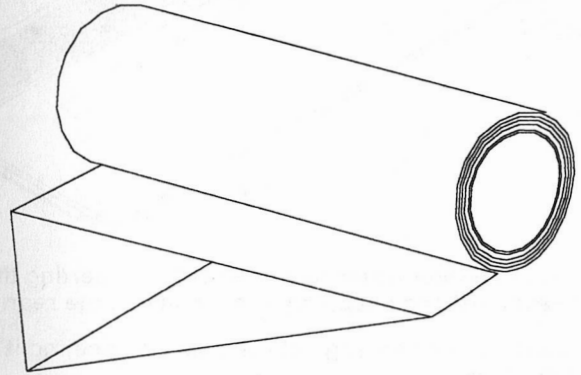
4. Plug the charger into the power source.

   LED ⚡ is orange when the rechargeable battery is charging.
   LED ⚡ turns off when the rechargeable battery is 75% charged.

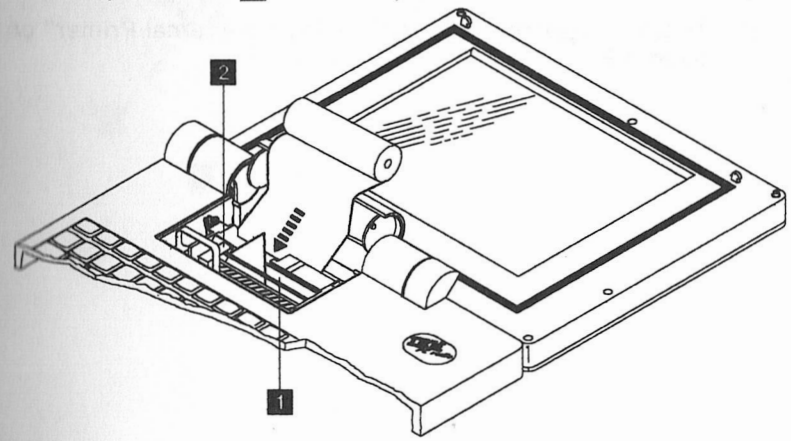
The system may remain connected to the charger after the light goes off. The charger continues to charge the battery at a slower rate.

Loading the Printer Paper

1. Place the roll of paper on the display, unrolling from the bottom as shown below.
2. Fold (do **not** cut) the leading edge of the paper as shown below.

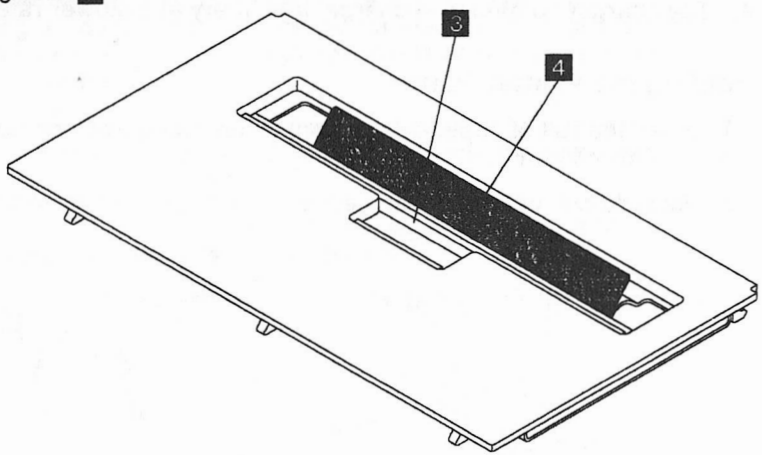


3. Slide the leading edge of the paper into the back of the printer as shown below until the paper appears between the platen 1 and the print head 2.



4 Pull the leading edge of the paper approximately 4 inches so that both sides are straight and smooth.

5 Open the sliding door 3. With the printer cover oriented as shown below, feed the leading edge of the paper through the bottom of the printer cover between the door 3 and the paper guide 4.



6 Place the printer cover over the printer, inserting the edge near the keyboard and snapping it into place at the rear.

7 Tear off the leading edge of the paper by peeling it across the printer door.

8 Place the roll of paper in the paper cover.

9 Close the paper cover.

10 To test the printer, refer to "Testing the Internal Printer" on page 6-8.

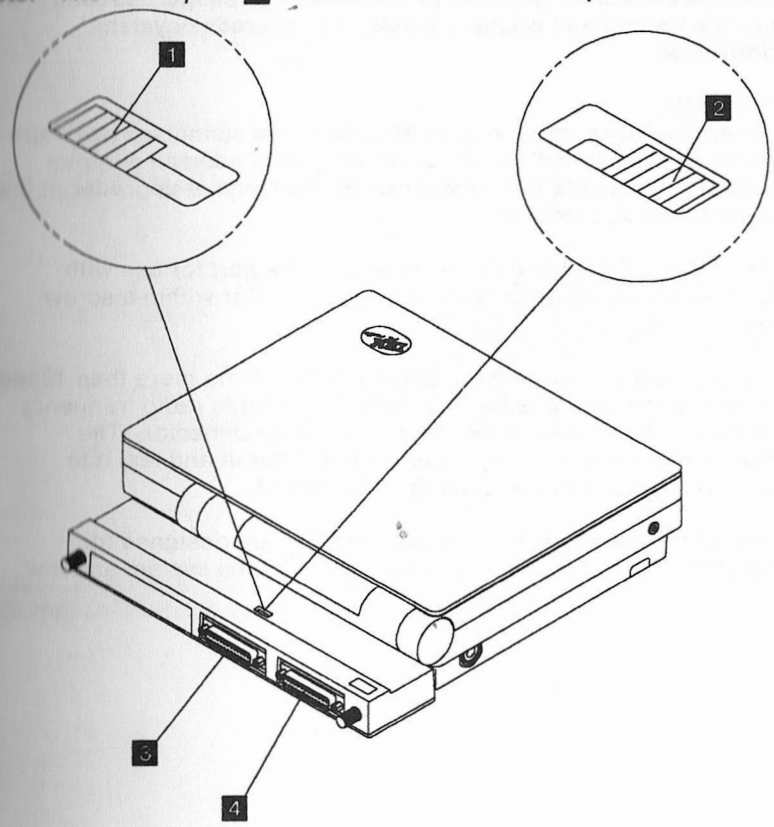
Setting the Breakout Box Switch

Set the switch to one of the following positions:

1 External printer – enables the parallel port 3 for an external printer or other parallel device.

2 Internal printer – enables the internal printer and disables the parallel port 3.

Note: The serial port 4 is enabled in both switch positions.



Attaching an External Antenna

The PCradio system includes an internal antenna. If you need to have an external antenna, use only a mobile antenna with a coaxial connector. When you connect the external antenna, the internal antenna is deactivated.

CAUTION:
To reduce the risk of shock hazard, do not use an antenna system connected externally to a building or other high support structure; this impacts personal and property safety, and degrades system performance.

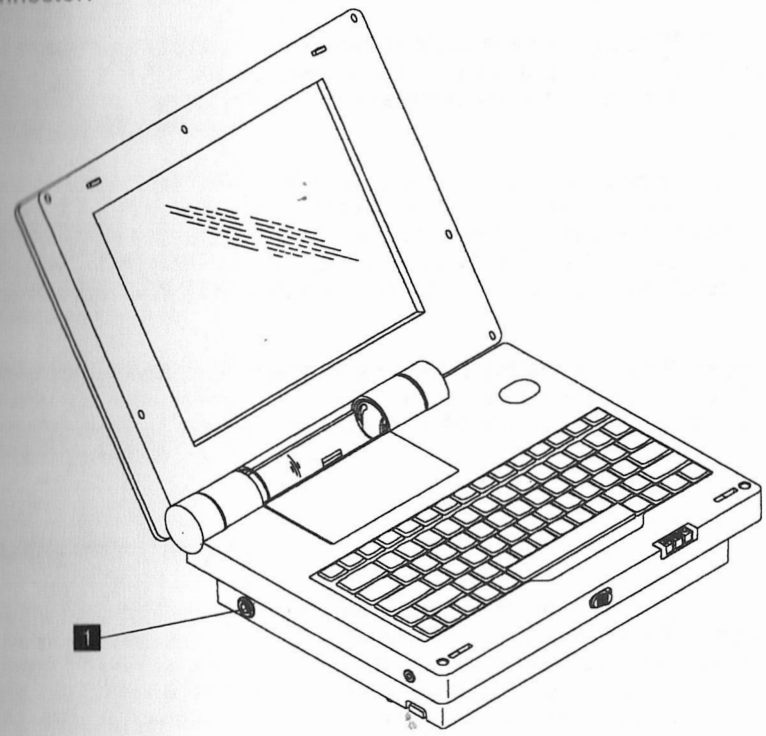
ATTENTION !
Pour réduire tout risque de choc électrique, ne connectez pas votre antenne à l'extérieur d'un bâtiment élevé; cela pourrait avoir un impact sur la sécurité des personnes et des biens et dégraderait les performances du système.

Models 002 and 003 have an *external antenna port* for use with mobile antennas. The port is a coaxial connector within a screw housing.

You can attach a coaxial cable to the unit that is no more than 12 feet long, and that is equipped with a male SMA series radio frequency connector. This may be a slip-on or threaded connector. The company who provides the antenna should install and test it to ensure that system performance is maintained.

The radio packet and cellular radio modems are designed for optimum performance using a low profile antenna system and low power.

To attach an external antenna, insert the cable connector into the antenna port 1 and secure the cable housing by screwing it onto the connector.



Note: Check with your network provider to verify that you can use an external antenna on the network.

Chapter 4. Porting Applications

This chapter describes how to port applications from your PS/2[1] system to your PCradio system. *Porting* is the process of transferring data from a computer with a diskette drive to the IC memory card-based PCradio system.

There are two methods to port applications — by primarily using a hardware device or by using software. The hardware method consists of attaching a *memory card programmer* device to a host computer. The software method consists of using a communications program that links two computers using the serial, parallel, telephone or cellular modem.

Before porting applications from your PS/2 system to your PCradio system, you should know the fundamentals about writing data to IC memory cards. These are described in Appendix C, "Understanding IC Memory Cards" on page C-1.

Hardware Porting

This porting method uses a memory card programmer, which may be an external device attached to the host computer. You must usually connect this commercially available device using a communications cable. You may also need to install an adapter card in the host computer. A memory card programmer can transfer data to one or more IC memory cards at a time.

Another type of memory card programmer fits into a drive bay in the host computer. This type of programming device can format, read, and write one memory card at a time. You may need an internal cable and adapter for operation.

After you format the IC memory card, you can copy data onto it and use it in the PCradio system.

[1] PS/2 is a trademark of International Business Machines Corporation.

Considerations

One of the primary considerations for the purchase of a memory card programmer is ensuring that they can read and write the memory cards that you are using. The following may help with your selection of these devices:

Memory Type Flash, SRAM, and combination Flash/SRAM memory cards each have unique formatting requirements. While these requirements are transparent to the user, it is important that you use the correct formatting device and formatting software for the memory card used. For example, if the programming device can only program 2MB SRAM cards and you use a 2MB Flash card, the formatting and data transfer will not work.

Card Capacity IC memory cards vary in storage capacity. Ensure that the device selected can read and write data to the memory cards that you plan to use.

Physical Type Use only the 68-pin type of memory card in this system. Cards designed for other devices may have 38-, 50-, or 60-pin connectors.

Software Porting

This type of porting method uses a parallel or serial cable to directly connect the PCradio system and another computer that has a diskette drive.

You need the following for the software porting method:

- Standard 25-pin or 9-pin D-shell connectors on the host computer
- Breakout Box (part number 92F1131)
- *NoteBook Manager*[2] *for the IBM PCradio* program (IBM order number 95F1386), which includes a serial and parallel cable, and a program called *LapLink*[2] *PRO*

You can use one of the following methods to port applications between your PS/2 and PCradio systems:

- *LapLink PRO*
- Remote drive access programs included with the PCradio system

[2] NoteBook Manager and LapLink are trademarks of the Traveling Software Corporation.

These methods are described in the following sections.

Using LapLink PRO

The *NoteBook Manager* program contains a program called *LapLink PRO*. This program uses the serial port, parallel port, or modem on each system for the data transfer.

Notes:

1. The *NoteBook Manager* program diskette contains a "README" file. Refer to this file before installing the program because it may contain new information for the product.
2. Refer to the *LapLink PRO* manual for information on porting applications through a modem.

To use *LapLink PRO* to port applications, do the following:

- If this is the first time using your IC memory card, perform the steps in "Initializing Your IC Memory Card" on page 4-4.
- If you have already initialized your IC memory card, continue with "Software Porting Using LapLink PRO" on page 4-5.

Using Remote Drive Access Programs

You can port software to the PCradio system without first having a communications program running on the PCradio system. The PCradio system includes remote drive programs that you can copy to the PS/2 and use to port applications. You need to use *LapLink PRO* or an equivalent program to copy the remote drive programs to the PS/2 system.

To use the remote drive programs to port applications, do the following:

- If this is the first time using your IC memory card, perform the steps in "Initializing Your IC Memory Card" on page 4-4.
- If you have already initialized your IC memory card, continue with "Software Porting Using the Remote Drive Programs" on page 4-8.

Initializing Your IC Memory Card

If this is the first time using your IC memory card, you must first perform the following steps:

1. Power on your PCradio system.
2. Insert your IC memory card in the PCradio system.
3. Select your PCradio's D: drive and type ICUTILS. Press **F3** on the ICUTILS screen to initialize the card. Follow the screen prompts. Refer to Appendix A, "Using the IC Card Utilities" on page A-1 for more information.
4. Press **Esc** to exit ICUTILS.
5. If you have an SRAM or Combination IC memory card, perform the following steps:
   a. Type ICFORMAT from your PCradio's D: drive. Make sure the IC memory card drive is highlighted (either A: or B:) and press **Enter**. Follow the screen prompts to format the IC memory card. Refer to Appendix B, "Using the ICFORMAT Screen" on page B-1 for more information.
   b. Press **F3** twice to exit ICFORMAT.
6. If you will be using *LapLink PRO* to port software, continue with "Software Porting Using LapLink PRO" on page 4-5.
7. If you will be using the remote drive programs to port software, continue with "Software Porting Using the Remote Drive Programs" on page 4-8.

Software Porting Using LapLink PRO

You need an SRAM or Combination IC memory card with at least 0.5M of free SRAM to port applications using *LapLink PRO*.

Remote Installing LapLink PRO on SRAM

You need to use the serial cable provided with *Notebook Manager* to install *LapLink PRO*. Perform the following steps to install *LapLink PRO* using the serial cable:

1. Connect the Breakout Box to your PCradio system.

   Note: The serial port is enabled in either switch setting on the breakout box.
2. Connect the serial cable provided with *NoteBook Manager* between the PCradio system and your PS/2 system.
3. Power on your PCradio system.
4. Press **Alt+Func+F1** to display the System Setup menu. Set the COM1 Serial Power parameter to **Always On**. Press **Alt+Func+F1** to update and exit.
5. Refer to the manuals provided with *NoteBook Manager* and install it on your PS/2 system.
6. Select the drive that contains your SRAM (either A: or B:) on the PCradio system.
7. Select the drive on which *LapLink PRO* resides on the PS/2 system and type

   ```
   LLPRO
   ```
8. Refer to the *LapLink PRO* manual for instructions on the following remote install process. Select the **Remote Install...** option in *LapLink PRO* to download *LapLink PRO* to the SRAM portion of your IC memory card.

   Notes:

   a. When *LapLink PRO* prompts you to type

      ```
      MODE COM1:2400,N,8,1,P
      ```

      you must actually type

      ```
      D:MODE COM1:2400,N,8,1,P
      ```

      on the PCradio system and press **Enter**.

b. Then type

```
CTTY COM1
```

and press **Enter**.

9 Press **Enter** on the PS/2 system. *LapLink PRO* should start dowloading.

10 When the download completes, *LapLink PRO* automatically starts on the PCradio system.

You are ready to port applications between the PS/2 and your PCradio's SRAM or Combination card using *LapLink PRO*. Refer to the instructions that came with *LapLink PRO* to transfer files.

Porting Applications between your PS/2 System and SRAM

To port applications between your PS/2 System and your SRAM card, perform the following steps:

1 Insert your SRAM card in the PCradio system.

2 Select the PCradio's SRAM drive on which you installed *LapLink PRO* (either A: or B:) and type

```
LLPRO
```

3 Select the PS/2's drive on which you installed *LapLink PRO* and type

```
LLPRO
```

You are ready to port applications between the PS/2 and your PCradio's SRAM card using *LapLink PRO*. Refer to the instructions that came with *LapLink PRO* to transfer files.

Writing to the Flash Portion of a Combination Card

To write to the Flash portion of a Combination card, perform the following steps:

1 Insert your Combination card in the PCradio system.

2 Make sure CONFIG.SYS and AUTOEXEC.BAT do not reside on the PCradio's C: drive.

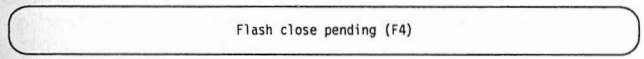
3 Select the PCradio's D: drive and type

```
ICUTILS /S:20
```

4 Press **F3** and follow the screen prompts to format the Flash portion of the Combination card.

Note: Press **Y** to use existing format when prompted to do so.

When the formatting is complete, you will see a window that describes the card. A short time later, the following window appears:



This indicates that you have successfully opened the Flash and can now write data to it. (**Do not** press **F4** yet.)

5 Press **CTRL+S**.

6 Type the drive and path on which you installed *LapLink PRO* on the PCradio system and type `LLPRO.EXE`. For example, if you installed *LapLink PRO* on drive A:, type

```
A:LLPRO.EXE
```

7 Select the PS/2's drive on which you installed *LapLink PRO* and type

```
LLPRO
```

8 You are ready to port applications between the PS/2 and the Flash portion of your PCradio's Combination card using *LapLink PRO*. Refer to the instructions that came with *LapLink PRO* to transfer files.

9 When you are finished porting applications, exit *LapLink PRO*.

Note: *LapLink PRO* may return an error code. Disregard this error code.

10 Press the **F4** key to close the Flash.

11 Press the **Esc** key to exit ICUTILS.

Software Porting Using the Remote Drive Programs

Your PCradio's D: drive contains the following programs to allow you to port applications between your PS/2 and PCradio systems:

PCRADIO.SYS A device driver that runs on your PS/2 and PCradio systems. This device driver provides access to remotely attached DASD as if they are direct attached.

ICUTILS.COM Runs on the PCradio system and provides several standalone utilities as well as communications with the PCRADIO.SYS device driver in your PS/2 system. This transient program allows the remote PCRADIO.SYS device driver to access its local DASD.

HFSERVER.COM This is a transient program that runs on your PC or PS/2 system and communicates with the PCRADIO.SYS device driver in your PCradio system. This program allows your PCradio system to access information from your PC or PS/2 system.

The following sections describe how to install the remote drive programs and how to use them to port applications.

Installing the Remote Drive Programs

1 Connect the Breakout Box to your PCradio system.

2 If you will use the parallel cable, set the switch on the Breakout Box to the External Printer position to enable the parallel port. Refer to "Setting the Breakout Box Switch" on page 3-9.

Note: The serial port is enabled in either switch setting on the breakout box.

3 Connect the parallel or serial cable provided with *NoteBook Manager* between the PCradio system and your PS/2 system.

4 Power on your PCradio system.

5 Select the drive on your PCradio system in which you have installed *LapLink PRO*.

6 Type

LLPR0

and press **Enter**.

7 Select the drive on your PS/2 system in which you have installed *LapLink PRO*.

8 Type

LLPR0

and press **Enter**.

9 Refer to the *LapLink PRO* manual for instructions on copying files. Use *LapLink PRO* to copy the following programs from your PCradio's D: drive to your PS/2 system:

- PCRADIO.SYS
- HFSERVER.COM

10 Exit *LapLink PRO* on the PS/2 and PCradio systems.

11 Continue with the next section.

Installing PCRADIO.SYS

Edit your CONFIG.SYS files as follows to install the PCRADIO.SYS device driver:

1 From your PCradio's D: drive, do the following:

a Copy your CONFIG.SYS file from your D: drive to your C: drive.

b Select your PCradio's C: drive.

c Type

```
COPY CONFIG.SYS +CON
```

d Type

```
DEVICE=D:PCRADIO.SYS
```

with the desired parameters described in Figure 4-1.

DEVICE = D:PCRADIO.SYS /f [/Pn]

/f This parameter defines the type of communications link you are using. Choose one of the following:

/N Parallel Nibble Mode

/C Serial Mode

If you are using the *LapLink PRO* serial cable, choose the /C option. If you are not using the first serial port, you must also define the port number using /Pn.

/Pn This optional parameter allows you to select a port number. n defines the port number and defaults to /P1 for COM1 or LPT1.

If you are using the *LapLink PRO* parallel cable, add the /N option.

Figure 4-1. PCRADIO.SYS Installation

Note: You can type `DEVICE=D:PCRADIO.SYS` more than one time in your CONFIG.SYS file with different parameters for special situations.

e Type **Ctrl+Z** and press **Enter** to exit the CONFIG.SYS file.

f If you have one copy of `DEVICE=D:PCRADIO.SYS` in your CONFIG.SYS file, copy your AUTOEXEC.BAT file from your D: drive to your C: drive.

g Select your PCradio's C: drive.

h Type

```
COPY AUTOEXEC.BAT +CON
```

i Type

```
SET ICUTILS=
```

with the desired parameters described in Figure 4-2 on page 4-11.

SET ICUTILS = /f

/f This parameter defines the type of communications link you are using. Choose one of the following:

/N Parallel Nibble Mode

/C Serial Mode

If you are using the *LapLink PRO* serial cable, choose the /C option.

Figure 4-2. SET ICUTILS Format

HFSERVER.COM uses "SET ICUTILS = " to determine the proper mode of communications so that you do not need to enter it on the command line.

j Remove the IC memory card.

k Restart the PCradio system.

2 From the PS/2 drive in which CONFIG.SYS resides, do the following:

a Type

```
COPY CONFIG.SYS +CON
```

b Type

```
DEVICE=D:PCRADIO.SYS
```

with the desired parameters described in Figure 4-1 on page 4-10.

c Type **Ctrl+Z** and press **Enter** to exit the CONFIG.SYS file.

d If you have one copy of `DEVICE=D:PCRADIO.SYS` in your CONFIG.SYS file, edit your AUTOEXEC.BAT to include

```
SET ICUTILS=
```

with the desired parameters described in Figure 4-2.

e Restart the PS/2 system.

You have installed the remote drive programs and are now ready to port applications using these programs. You can port applications using your:

- PS/2 system, or
- PCradio system

The following sections describe how to port applications using each system.

Porting Applications Using the PS/2 System

If you want to have access to the PCradio drives from the PS/2 system, perform the following steps:

1. Power on the PS/2 and PCradio systems.
2. If you are using a serial cable, do the following:
   a. Make sure that your CONFIG.SYS file contains

      ```
      DEVICE=D:PCRADIO.SYS /C
      ```

      Refer to Figure 4-1 on page 4-10 for more information.
   b. Make sure that your AUTOEXEC.BAT file contains

      ```
      SET ICUTILS=/C
      ```

      Refer to Figure 4-2 on page 4-11 for more information.
   c. If you made any changes to your CONFIG.SYS or AUTOEXEC.BAT files, restart your PCradio system without an IC memory card inserted.
   d. Select your PCradio's D: drive and type

      ```
      MODE COM1 19200,n,8,1
      ```

      Press **Enter**.
3. If you are using a parallel cable, do the following:
   a. Make sure your CONFIG.SYS file contains

      ```
      DEVICE=D:PCRADIO.SYS /N
      ```

      Refer to Figure 4-1 on page 4-10 for more information.
   b. Make sure your AUTOEXEC.BAT file contains

      ```
      SET ICUTILS=/N
      ```

      Refer to Figure 4-2 on page 4-11 for more information.
   c. If you made any changes to your CONFIG.SYS or AUTOEXEC.BAT files, restart your PCradio system without an IC memory card inserted.
4. Press **Alt+Func+F1** to display the System Setup menu on the PCradio system and do the following:
   a. Set the COM1 Serial Power parameter to **Always On**.
   b. If you are using a parallel cable, set the Printer Power parameter to **On**.
   c. Press **Alt+Func+F1** to update and exit.
5. Insert the IC memory card in the PCradio system.
6. If you are using a serial cable, select the D: drive on your PCradio system and type

   ```
   MODE COM1 19200,n,8,1
   ```

   Press **Enter**.
7. From the PCradio's D: drive, type

   ```
   ICUTILS
   ```

   with the desired parameters described in Figure 4-3 and press **Enter**.

ICUTILS /f [/Pn] [/s:nnn]

/f	This parameter defines the type of communications link you are using. Choose one of the following: **/N** Parallel Nibble Mode **/C** Serial Mode
/Pn	This optional parameter allows you to select a port number. n defines the port number and defaults to /P1 for COM1 or LPT1.
/s:nnn	This parameter defines the number of subdirectory buffers to allocate. nnn can be any number between 0 and 127. Subdirectory buffers are used to buffer subdirectory information during writes to Flash. 30 buffers are defined by default. You can define a lower number of buffers in order to allow more free space for the DOS shell (Ctrl + D) or a shell to another program (Ctrl + S). If you have a complex sub-directory structure, you can increase this value.

Figure 4-3. ICUTILS - IC Card Utilities Execution

Refer to Appendix A, "Using the IC Card Utilities" on page A-1 for a detailed description of the functions in the ICUTILS program.

8. You now have access to the PCradio drives from the PS/2 system. You can use DOS commands, such as `DIR` and `COPY`, to port applications. Refer to "Drive Letter Assignments" on page 4-16 for information on how the drives are assigned.
9. If you want to write to a Flash card, you need to open the Flash card before writing to it. Continue with step 2 in "Writing to a Flash Card from DOS" on page 4-18.
10. To exit the ICUTILS program on the PCradio system and return to DOS, press the **Esc** key.

Porting Applications Using the PCradio System

If you want to have access to the PS/2 drives from the PCradio system, perform the following steps:

1 Power on the PS/2 and PCradio systems.

2 If you are using a serial cable, do the following:

a Make sure your CONFIG.SYS file contains

```
DEVICE=D:PCRADIO.SYS /C
```

Refer to Figure 4-1 on page 4-10 for more information.

b Make sure your AUTOEXEC.BAT file contains

```
SET ICUTILS=/C
```

Refer to Figure 4-2 on page 4-11 for more information.

c If you made any changes to your CONFIG.SYS or AUTOEXEC.BAT files, restart your PCradio system without an IC memory card inserted.

d Select your PCradio's D: drive and type

```
MODE COM1 19200,n,8,1
```

Press **Enter**.

3 If you are using a parallel cable, do the following:

a Make sure your CONFIG.SYS file contains

```
DEVICE=D:PCRADIO.SYS /N
```

Refer to Figure 4-1 on page 4-10 for more information.

b Make sure your AUTOEXEC.BAT file contains

```
SET ICUTILS=/N
```

Refer to Figure 4-2 on page 4-11 for more information.

c If you made any changes to your CONFIG.SYS or AUTOEXEC.BAT files, restart your PCradio system without an IC memory card inserted.

4 Press **Alt+Func+F1** to display the System Setup menu on the PCradio system and do the following:

a Set the COM1 Serial Power parameter to **Always On**.

b If you are using a parallel cable, set the Printer Power parameter to **On**.

c Press **Alt+Func+F1** to update and exit.

5 Insert the IC memory card in the PCradio system.

6 Type

```
HFSERVER
```

on the PS/2 system with the desired parameters described in Figure 4-4 and press **Enter**.

HFSERVER [/f:] [/Pn] [/M:abcdefgh]

/f This optional parameter defines the type of system you are using. This parameter is only necessary if you do not use SET ICUTILS=. Refer to Figure 4-2 on page 4-11. You can choose one of the following:

- **/N** Parallel Nibble Mode
- **/C** Serial Mode

/Pn This optional parameter allows you to select a port number. n defines the port number and defaults to /P1 for COM1 or LPT1.

/M:abcdefg This optional parameter allows you to remap drives on the PS/2 system. Drives are normally accessed sequentially from the PCradio system as described in "Drive Letter Assignments" on page 4-16. The PS/2's diskette drive (A:) is accessed as PCradio's E: drive, PS/2's fixed disk drive (C:) is accessed as PCradio's G: drive, and so on. This parameter allows you to change the default assignments. The first drive letter following the /M: will be accessed as PCradio's drive E:, the second drive letter as PCradio's drive F:, and so on.

Figure 4-4. HFSERVER - PS/2 File Access

7 You now have access to the PS/2 drives from the PCradio system. You can use DOS commands, such as `DIR` and `COPY`, to port applications. Refer to "Drive Letter Assignments" on page 4-16 for information on how the drives are assigned.

8 To exit the HFSERVER program on the PS/2 system and return to DOS, press the **Esc** key.

Drive Letter Assignments

DOS automatically assigns the drive letters as the drives immediately following any current drives. For example, if you have one fixed disk drive (C:), DOS assigns the PCradio drive letters as follows:

D: IC memory card Flash (PCradio A: or B: drive)

E: IC memory card SRAM (PCradio A: or B: drive)

F: RAM drive (PCradio C: drive)

G: ROM drive (PCradio D: drive read only)

You may have assigned additional fixed disk drives or logical drives through your Local Area Network, LapLink Pro, or another application. If you have more fixed disk drives or other logical drives assigned prior to this driver, the drive letters change accordingly. You can look at your CONFIG.SYS file to see how your drives are assigned.

Notes:

1. If you do not want to look at your CONFIG.SYS file, you can type the DOS DIR command at each drive on your PS/2 and PCradio systems to check which drive directories match.
2. You may need to add 4 to the LASTDRIVE= command in your CONFIG.SYS file to account for the 4 new drives that are assigned.
3. You can assign Flash or SRAM as either the A: or B: drives on the PCradio system. The device driver always assigns them in the order shown above. Refer to Figure 4-5 on page 4-17 for an example.

The following figure shows a typical PS/2-to-PCradio connection.

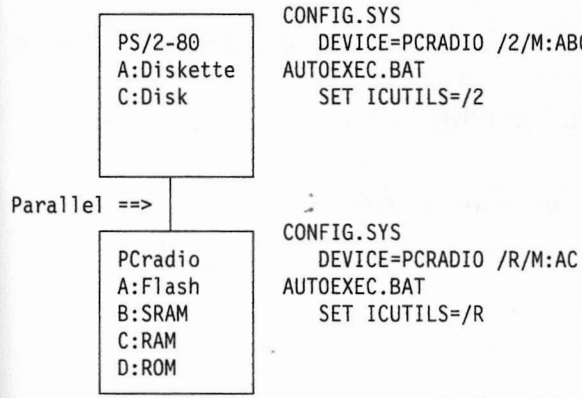


Figure 4-5. PS/2-to-PCradio Connection

With the PS/2 system running DOS and the PCradio system running ICUTILS.COM, the PS/2 system can access the following drives:

```
A: Local diskette
C: Local Disk
D: PCradio's Flash
E: PCradio's SRAM
F: PCradio's RAM drive
G: PCradio's ROM drive
```

With the PS/2 system running HFSERVER.COM and the PCradio system running DOS, the PCradio system can access the following drives:

```
A: Local Flash
B: Local SRAM
C: Local RAM drive
D: Local ROM drive
E: PS/2's diskette
F: PS/2's Disk
```

Writing to a Flash Card from DOS

Before you can write to a Flash card, you must perform the following steps:

1 From the PCradio's D: drive, type

```
ICUTILS
```

A screen similar to the following appears:

```
                        ICUTILS

PCradio IC Card Utilities
Version 1.01
(C) Copyright IBM Corp. 1991, 1992
Program Property of IBM.

/    Verify Mode is A:B: ON C:D: ON (Ctrl+V)

F1 - Format RAM Drive (C:)          F7  - Copy SRAM to SRAM Card
F2 - Format SRAM                    F8  - Copy Flash to Flash Card
F3 - Format Flash/Initialize Card   F9  - Copy SRAM to Flash Card
F4 - Close Flash Write              F10 - Copy Flash to SRAM Card
F5 - Change Battery Date            F11 - Save IC Card Configuration
F6 - Display/Check Memory Areas     F12 - Compare IC Card Configuration

Esc = End
```

2 Insert your Flash card and press **F3**. Follow the screen prompts to format the card. This procedure erases the current Flash content and temporarily buffers the first part of the Flash in a read/write RAM area. This buffered area contains the DOS root directory information needed to manage the content of the Flash. When the formatting is complete, you will see a window that describes the card. A short time later, the following window appears:

```
Flash close pending (F4)
```

This indicates that you have successfully opened the Flash and can now write data to it. (**Do not** press **F4** yet.)

3 If you have installed the remote drive programs, you now have access to the PCradio drives from the PS/2 system. If you want to port applications between your PS/2 system and the Flash card, you can use DOS commands such as DIR and COPY on the PS/2 system to port applications.

4 If you want to write to the Flash card from the PCradio system, you can now use the ICUTILS DOS shell to write data to the Flash. Press **Ctrl+D**. The DOS prompt appears. You can now use normal DOS COPY commands to create your Flash content. You cannot erase or update any files written to the Flash. You can only write to the Flash once after completing an erase cycle. DOS buffers all reads and writes to the DOS directory during the copy process. This buffering allows you to perform an unlimited number of updates to the directory area without changing the Flash content.

5 When you are finished writing to Flash, type

```
EXIT
```

to return to the ICUTILS screen.

6 Press the **F4** key to close the Flash. The ICUTILS program writes all buffered data to the Flash. After a close completes, the Flash is no longer writable.

Note: If you remove the card without completing the close process, you cannot use the card again until you initialize it. You will lose all data that you wrote to the card including the SRAM.

7 Press the **Esc** key to exit ICUTILS.

Special Rules for Writing Flash

Because you can only write Flash once after erasing it, you must follow some special rules to avoid writing a data area more than once:

- Do not modify any files.
- Do not erase any files.
- Do not copy the same file twice.
- Limit the complexity of your sub-directory structure.

ICUTILS provides RAM buffering for a limited sub-directory structure. If you exceed the buffer capabilities, you will get an error when you try to create a new file or when you close the flash. In either case, the Flash content may not be usable after the error.

If you must use a complex directory structure in Flash, you can create your application on an SRAM card and copy the SRAM card to a Flash. Alternately, you can increase the number of sub-directory buffers used by ICUTILS and use the remote drive access capabilities of PCRADIO.SYS or HFSERVER.COM to create your Flash image. Refer to Figure 4-3 on page 4-13 for information on increasing the number of sub-directory buffers.

Chapter 5. Using the Cellular Voice Program

The Cellular Voice Program resides on ROM drive D, and is a DOS terminate and stay resident (TSR) program. This program enables use of the cellular modem for voice-only operation. You can create a simple telephone book by using DOS commands.

Phone Books

You can use both NoteBook Manager and simple phone books. To make a simple phone book, perform the following steps:

1. Type the following at the DOS prompt:

   ```
   COPY CON C:\PHONE.BK
   ```

   Then, press Enter. This command tells DOS to begin saving information to a file named PHONE.BK on RAM drive C.

2. Type a name and phone number separated by a vertical bar (¦), as follows:

   ```
   Toll Free Information ¦ 1 800 555 1212
   IBM Special Needs Systems ¦ 1-800-IBM-2133
   ```

   Press Enter after each phone number. Use dashes and spaces to separate numbers.

3. To end the process, press **Ctrl+Z**, then press **Enter**.

To add more entries at a later time, type the following at the DOS prompt:

```
C:
```

and press **Enter**. This changes the default drive to the drive that contains PHONE.BK. Then type the following:

```
COPY PHONE.BK+CON
```

Be sure to use the + sign because it tells DOS to add information to the existing file. Add names and phone numbers as described before. You can save the phone number file to any SRAM drive.

The phone book file is only read when you initially load the Voice program into memory.

Warning: Use of the suspend mode when the Voice program is in memory puts the communications application program in an undetermined state. The program must be removed from memory, and then reloaded.

Avertissement: L'utilisation du mode Pause provoque l'interruption de la session de communication (liaison). Le programme de communication passe alors dans un état indéterminé exigeant la mise hors tension du système, puis sa remise sous tension.

To load the Voice program into memory, perform the following steps:

1 Type the following at the DOS prompt (use lowercase letters for the parameters):

```
VOICE /k /q /p:<path>
```

Separate the parameters by a space. Then, press Enter. The parameter definitions follow:

/k Use this parameter to remove the program from memory. Enter the /k parameter with no other parameters.

CAUTION:
Any communications program loaded after the Voice program which uses the COM3 port must restore the COM3 interrupt vector when it finishes executing. Otherwise, the Voice program cannot be removed from memory or activated.

/q This is Quiet mode. The system suppresses all screens that do not require operator action. This does not affect the operation of the program. Use quiet mode to load the program into and remove it from memory from within a batch file.

/p: Use this parameter to specify the path and file name of the phone book, for example, `/p:c:PHONE.BK`
This phone book remains the default until you specify a new phone book. To change the phone book, remove the Voice program from memory and reload the Voice program with the new phone book path.

2 Type **Alt-V** and press **Enter** at the DOS prompt to activate the Voice Program.

3 Type **VOICE ?** at the DOS prompt and press **Enter** for additional information.

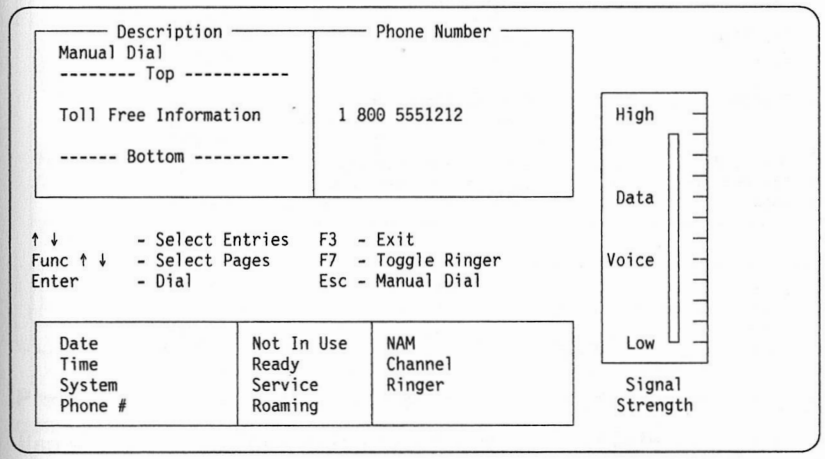
If communications difficulties occur:

- Remove the program using the /k parameter, then reload the program.
- Verify that COM2/COM3 is set to Normal at the System Setup Menu.

- The Voice program disables the **Ctrl + Break** key combination.

Using the Main Menu

After you activate the Voice Program, the Main Menu appears. Use the cursor control keys (arrows) to move between fields on the screen.



The information contained in the selected phone book appears. The Signal Strength indicator shows the recommended signal strength for both voice and data communications. If the Signal Strength is below Voice, move the unit (maybe closer to a window) and try again.

You can use the following keys:

↑ ↓ Moves the cursor through different entries of the phone book.

Func ↑ ↓ Moves the cursor through different pages of the phone book.

Enter Dials the selected phone number.

F3 Exits the Main Menu.

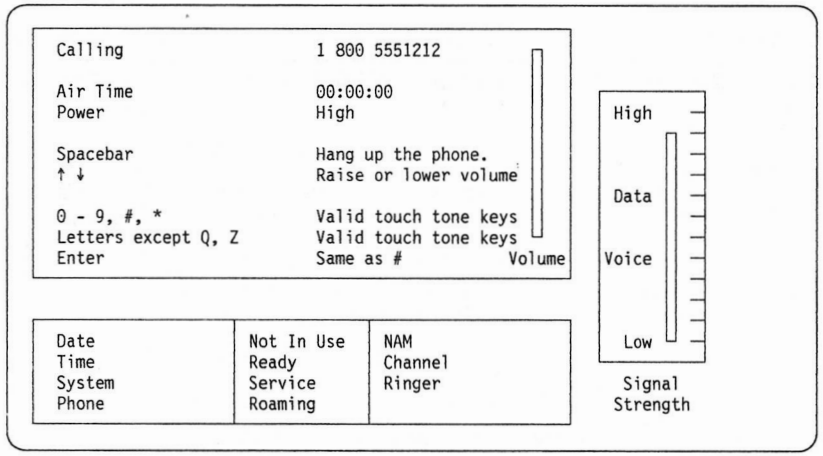
F7 Disables or enables the audible alarm while in the Voice program. If you disable the audible alarm, the screen still flashes to notify you of an incoming call. If you exit the Voice program, the audible alarm is automatically enabled.

Esc Exits the phone book so that you can manually enter a phone number.

The read-only information at the bottom of the screen is described on page 2-15.

Using the Outgoing Call Screen

When you make an outgoing call, the following screen appears:



This screen displays the telephone number dialed, air time of the call (hh:mm:ss), and the amount of power used by the cellular transmission.

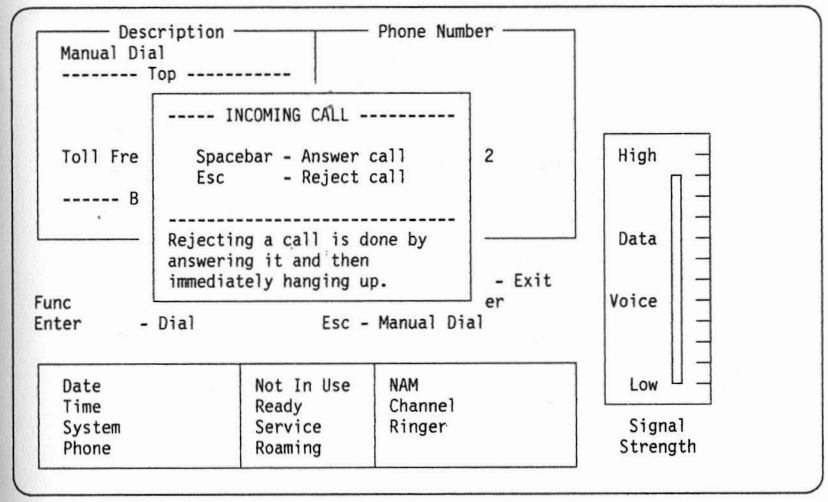
Note: The air time of the call is approximate. Do not use this time for billing purposes.

Press the up and down arrow keys to change the volume of the telephone handset attached to the unit. The Volume bar indicates the current volume level.

You can use 0-9, #, *, Enter, and all the letters except Q and Z when a call is in progress. Pressing the **Enter** key has the same effect as pressing the # key.

Using the Incoming Call Screen

When an incoming call arrives, the following screen appears:



Press the Spacebar to answer the incoming call. When you want to complete the call, press the Spacebar again to hang up.

Press the Esc key to not answer the incoming call. The ringing stops.

Chapter 6. Testing the System

Use the following procedure to test the system and solve system problems.

1 Power on the system unit.

2 Do you have data that you want to save on your C: drive?

Yes Backup the data on your C: drive.

No Continue with the next step.

3 Press **Alt+Func+F1** to display the Setup menu.

```
========================== SYSTEM SETUP MENU ==========================
                           IBM 9075 PCradio

----------Clock----------  -System Power Management-  --Communications--
Current Time:     12:00:00  CPU Speed:           Fast  COM2/COM3   Normal
Date: Tue   January 1,1991  Doze Timeout (sec):    5
Alarm Turn On Time:    Off  Sleep Timeout (min):    2  ---COM1 Serial----
                            Suspend Timeout (min):  1  Power:  Always Off
----------Display---------  Alarm Trigger:       LOWB2  Baud Rate:    2400
Power:              Sleeps  Alarm Type:         WINDOW  Data Bits:       8
Backlight Power:    Sleeps  Alarm Interval (min):   2  Stop Bits:       1
Screen:     Black on White                             Parity:       None
Video Activity Monitor: On  ---------Keyboard--------
                            Power:              Sleeps  ----COM2 Modem----
----------Printer---------  Key Click:             On  Power:  Always Off
Power:              Sleeps  Delay (msec):         500  Baud Rate:    2400
Character Darkness:      1  Rate (/sec):         10.0  Data Bits:       8
                                                       Stop Bits:       1
------Drive Selection-----  -------------------------  Parity:       None
Load DOS From:          ROM  Backup Battery Life    12
Resident Diagnostics:   Off                            ----COM3 Radio----
                                                       Power:          On

1. Position Cursor      2. Press Spacebar, +, -    3. Press Alt-Func-F1
   using Keypad Arrows     to Change                  to Update and Exit
```

4 Move the cursor to **Resident Diagnostics** and press the Spacebar.

5 Press **Alt+Func+F1** to set the selection.

6 Press **Enter** to restart the system.

7 When the IBM logo appears, press **Enter**. The Diagnostics menu appears.

Note: The following screen is for Version 1.10 of diagnostics. Version 1.00 has a different screen.

```
IBM 9075 PCradio
DIAGNOSTICS
Version 1.10

(c) Copyright IBM Corporation, 1981, 1992


SELECT AN OPTION

0 - SYSTEM CHECKOUT
1 - IC CARD UTILITIES
2 - RADIO MODEM PERSONALIZATION


9 - END DIAGNOSTICS

Select a Number and Press ENTER
?
```

8 Type **0** and press **Enter** to perform a system checkout.

9 The system checks which devices are installed and then displays an Installed Devices screen similar to the following:

```
THE INSTALLED DEVICES ARE

 1 - SYSTEM UNIT
 2 -   640KB MEMORY
 3 - KEYBOARD
 5 - DISPLAY
 6 - IC MEMORY CARD DRIVE
 9 - PARALLEL PORT
11 - SERIAL PORT
12 - INTERNAL MODEM
16 - RF PORT


IS THE LIST CORRECT (Y/N)
?
```

10 Verify that the list on your screen is correct. Is the list correct?

Yes Press **Y** and press **Enter**. The system test begins.

No Press **N** and press **Enter**. Follow the prompts to add or delete devices. Then press **Enter** to begin the system test.

The system tests the devices in the sequence in which they appear on the Installed Devices screen. Follow the screen prompts for each test. All tests are numbered. Note any error messages. Insert an IC memory card when the system prompts you to enter the card. Refer to "Using the IC Memory Card" on page 2-16 for card insertion and removal instructions. If you receive an error message, find the error in the "Troubleshooting Charts" on page 6-5 and take the action listed. When all tests have completed, the Services menu appears.

11 Select **1** and press **Enter** to begin the IC Card Utilities program.

The ICUTILS screen appears.

```
                              ICUTILS

PCradio IC Card Utilities
Written by: Don D. Williams
Version 1.00
(C) Copyright IBM Corp. 1991, 1992
Program Property of IBM.

/    Verify Mode is A:B: ON C:D: ON (Ctrl+V)

F1 - Format RAM Drive (C:)          F7 - Copy SRAM to SRAM Card

F2 - Format SRAM                    F8 - Copy Flash to Flash Card

F3 - Format Flash/Initialize Card   F9 - Copy SRAM to Flash Card

F4 - Close Flash Write              F10 - Copy Flash to SRAM Card

F5 - Change Battery Date            F11 - Save IC Card Configuration

F6 - Display/Check Memory Areas     F12 - Compare IC Card Configuration

Esc = End
```

12 Do you have data that you want to save on your IC memory card?

Yes Use one of the copy functions to save the data onto another IC memory card and then continue with the next step. Refer to Appendix A, "Using the IC Card Utilities" on page A-1 for a complete description of the functions on the ICUTILS screen.

No Continue with the next step.

13 Press **F1** to format the Direct Access Storage Device (DASD) (drive C:) on the system.

14 Press **F3** to initialize an IC memory card for test purposes. If you are asked to use the existing format, answer **No**.

15 Verify that the memory size displayed matches the memory size of your IC memory card. If not, contact your IBM Service Representative. Press **Enter** to continue.

16 If you have a combination card, assign the SRAM as drive A: when prompted to select A or B.

17 Press **F4** to complete the formatting of the IC memory card.

18 Press **F6** to display the location and a brief status of the available memory areas. If a memory area is available but not formatted, a `Not Formatted For DOS` message appears. This may also indicate the memory area is other than a computer memory card, that is, the card is for a video cassette recorder (VCR) or similar device. If you receive an error message, contact your IBM Service Representative.

19 Press **Esc** to exit the ICUTILS screen and display the Diagnostics screen.

20 Press **9** and press **Enter** to exit diagnostics.

21 Press **Enter**. DOS loads from the device selected on the Setup menu before you entered diagnostic mode.

22 If you have an SRAM or combination IC memory card, type `D:ICFORMAT` at the DOS prompt, then press **Enter** to format the card for DOS.

A screen similar to the following appears:

```
ICFORMAT - IC Card Format Program

IC Card Type: 1.5 MEG COMBO CARD
IC Card Drive B:                    Drive C:
Volume Label: BDRIVE-SRAM           Volume Label: CDRIVE-SRAM
Volume Serial: 118E-3985            Volume Serial: 1499-9FF8

Size              516,038 bytes     Size              124,578 bytes
User Files              0 bytes     User Files        123,579 bytes
Available         516,038 bytes     Available             999 bytes

Battery Replacement    03/11/1992
Battery Expiration     03/11/1993
Card Initialization    01/08/1992

                    FORMAT A:

                    FORMAT C:

                    SET IC CARD REPLACE DATE

F1=Help    F3=Exit    F6=Data Check    Enter=Select
```

23 Verify that the information displayed is correct. If so, move the cursor to `FORMAT A:` and press **Enter**. The program formats the IC memory card.

24 Press **PF3** to exit the ICFORMAT screen. For more information on the ICFORMAT screen, refer to Appendix B, "Using the ICFORMAT Screen" on page B-1.

This completes the System Checkout. If the system diagnostics did not run correctly or you received an error message, refer to the "Troubleshooting Charts" and take the action corresponding to your error.

Troubleshooting Charts

Find your error message in the following table and perform the action shown. If your system is reporting more than one error message, take the action listed for the *first* error message.

Note: An **X** can be any number.

Error Message	Action
Setup menu appears at every power on.	Change the system backup battery. If the problem remains, have the system serviced.
199 - Installed Devices List Error	If a device was missing from the list, have the system serviced.
2XX - Memory Error	Have the system serviced. Pressing the **F1** key allows you to continue using the system with reduced memory.
301 - Keyboard or Computer Error	Make sure that a key is not being held down. If a key is not being held down, power off the system, then power it on. If the **301** error remains, have the system serviced.
302 - Terminal Error **1XX** - System Board Error **2XX** - Memory Address Error **3XX** - Keyboard Error **5XX** - Display Screen Error **6XX** - IC Memory Card Error **9XX** - Parallel Port Error **11XX** - Serial Port Error **12XX** - Internal Modem Error **14XX** - Printer Error **16XX** - RF Port Error	Have your system serviced.
17XX - Radio Packet Modem Error **18XX** - Cellular Radio Modem Error	Ensure that the device is installed. If it is, have the system serviced.
ROM Error	Have the system serviced.

If you did not receive any of the error messages listed above, look for your symptom in the following table and perform the action listed.

Symptom	Action
No beep during POST	Have the system serviced.
1 long, 1 short beeps during POST	Have the system serviced.
1 long, 2 short beeps during POST	Have the system serviced.
1 long, 3 short beeps during POST.	Check/replace system backup battery. If battery okay, have system serviced.
3 short beeps during POST	Check IC memory card battery. If okay, have system serviced.
Alternating high and low beeps	Turn on the Alarm mode in the Setup menu to enable the alarm type and determine the error.
Continuous beep	Have the system serviced.
Display screen too light or too dark	Adjust the contrast.
Blank or unreadable display	Press the **Resume** key to verify that the system is not in Sleep mode. Adjust the contrast. If the failure continues, have the system serviced.
Any other POST error message	Have the system serviced.
Keyboard not working properly or 2 short beeps	Power off the system. Press all keys on the keyboard. Power on the system. If the failure continues, have the system serviced.
Any printer error or problem	Go to "Testing the Internal Printer" on page 6-8.

If you have reached this point and have not identified your problem, call **1-800-IBM-SERV**.

General Problem

The following are possible causes of failures that the diagnostics cannot detect. If you try the suggested action but the failure remains, have the system serviced.

Failure	Cause/Action
System does not load. LED⁄ and LED^v may flash.	Low power condition. Replace or charge rechargeable battery.
Line drawing characters do not form solid lines on printer.	Normal. Characters do not fill print character cell.
Cannot power off when pressing **Func+Off** for three seconds.	Remove and reinstall the rechargeable battery and remove all power. If the problem re-occurs, have the system serviced.
System powers off without low battery warning.	Warning is disabled in the Setup menu; the system may be defective; an over-temperature condition suspends activity.
System locks up.	Press **Func+Off** and wait three seconds; then power on system.
System does not load after rechargeable battery removal and replacement.	Retry power on. **Note:** This may be caused by a defective application, or by an invalid config.sys or autoexec.bat file.
Loss of data.	Restore backup data. Have the system serviced.

Getting the System Back to the System Defaults

1. Remove the rechargeable battery, system backup battery, and IC memory card.
2. Wait 5 minutes.
3. Re-install the batteries.
4. Power on the system.

The System Setup menu should automatically appear.

Testing the Internal Printer

1. Power on the system unit.
2. If the Setup menu does not display, press **Alt+Func+F1**.
3. When the Setup menu appears, move the cursor to the **Printer Power** field using the ↑ and ↓ keys. Change the value to **Always On** using the +, –, or Spacebar keys.
4. Press **Alt+Func+F1** to save this change and exit the Setup menu.
5. At the D: prompt, press **Alt+Func+F1** to display the Setup menu again.
6. Move the cursor to the **Character Darkness** field. Press **P** to check the character darkness. The following sequence is executed: carriage return, print darkness number, two spaces, print uppercase alphabet, and three carriage returns.
   - If the printer does not print, verify that the printer cables are properly seated.
   - If you hear the printer printing but the paper does not advance, check the paper path.
   - If no print appears on the paper, verify that the print surface of the paper faces the print head.
7. Press the – key to increase the character darkness, or the + key to decrease the character darkness. Press **P** to print the test pattern again.
8. Press **Alt+Func+F1** to exit the Setup menu and save any changes.

The printer test is complete.

Chapter 7. Maintaining the System

The following describes the proper handling of the system unit, batteries, and paper.

Cleaning the System

The system is designed so that spills will not cause internal damage. Gasket material protects all seams.

1. Power off the system unit.
2. Remove the rechargeable battery.
3. Using a cloth dampened with water, wipe the exterior surfaces of the system. Use only enough water to clean the system.

   Note: Any other cleaning solution may damage the unit.
4. Using a clean, soft cloth, immediately dry off any excess moisture.

Storing and Using Thermal Paper

Thermal paper stored at 25°C (77°F) and 65% relative humidity has a shelf life of five years. The paper begins to develop color at 70°C (158°F). Under humid conditions, paper deteriorates at an accelerated rate. Note the following guidelines:

- Do not store or use paper in environments where the temperature exceeds 40°C (104°F) for more than 24 hours.
- The paper becomes damaged and unusable at 95% relative humidity (RH).
- Sunlight causes thermal paper to yellow.
- Adhesives containing alcohol, organic solvents, and chemicals generally available cause thermal paper to discolor.
- Starch or polyvinyl acetate adhesives, and double-sided self-adhesive tape are recommended for pasting.
- Store paper in files and cases made from polyethylene, polypropylene, and polyester. Printer images should not face each other.
- Avoid contact with blueprint copy paper.

- Frictional heat and scratching cause images to develop on the thermal paper.
- The printer does not feed paper reliably at temperatures above 50°C (122°F) at 80% RH.

System Power Management

The System Power Management options in the Setup menu extend battery life and system performance. Exact battery life varies according to:

- how you set the options
- the applications you use
- how many input/output accesses
- the initial state of the battery

You can extend battery life by selecting the following device settings when possible:

Feature	Setting
COM2/COM3 Power	Always OFF
Printer Power	Always OFF
COM1 Power	Always OFF
CPU Speed	SLOW
Backlight Power	Always OFF

Chapter 8. Features, Accessories and Supplies

This chapter contains descriptions of the features, accessories, and supplies available for the system.

Rechargeable Battery

Warning: The use of unapproved battery chargers or external power supplies may cause serious damage to the system.

Avertisement: L'utilisation de chargeurs de batterie non homologués ou d'unités d'alimentation externes peut gravement endommager le système.

The main battery supplies nominally 7.2 volts (V) dc with a capacity of 1.7 ampere hours (AH). The battery pack is rechargeable and replaceable. During normal operation, the battery pack provides all power to the system.

System Backup Battery

When the system is off, the system backup battery preserves the setup information, the real-time clock in the CMOS SRAM, and the C drive. The battery is accessible from the bottom of the unit.

The system backup battery has an average life expectancy of 1 year. A message appears on the screen when the battery expires to indicate the date of expiration. See "System Backup Battery Warning" on page 3-1.

Battery Chargers

Battery chargers are used to charge the nickel-cadmium rechargeable battery which powers the system. Battery chargers do not power the system.

There are two battery chargers available:

- A *portable* charger with an input voltage of 115 V ac
- A *mobile* charger with an input voltage of 10.6 – 16.0 V dc

The battery charger charges the rechargeable battery when it is installed in the system and the system is powered off.

Carrying Case

The carrying case holds one unit and a spare rechargeable battery; the case is made of woven fabric with a shoulder strap and plastic fasteners.

Carrying Strap

The carrying strap is a shoulder strap with fasteners that attach to the PCradio unit.

Cellular Handset

The handset for Model 003 is audio/voice exchange. A standard jack connects the Model 003 to a telephone/cellular handset.

Telephone Cable

The telephone cable is 6 feet long with a 6-position, 2-wire modular connector at each end. This cable attaches the unit to a telephone jack, allowing communications through the 2400 bps telephone line modem.

Internal Printer

The internal printer is a 40-column 40 characters per second (cps) thermal printer. You can control character darkness through the Setup menu.

The printer uses roll paper with the print surface on the outside of the roll. The paper is sensitive to sunlight and scratching. See "Storing and Using Thermal Paper" on page 7-1.

Breakout Box

The breakout box attaches to the 104-pin connector at the back of the unit. It allows the user to attach external parallel and serial devices.

The switch on the breakout box has 2 positions:

- Internal Printer – enables the internal printer only.
- External Printer – enables the external printer or parallel device.

IC Memory Cards

The IC memory card plugs into the IC memory card slot on the system. You can use an IBM-supplied IC memory card listed in "Part Numbers and Feature Numbers" or equivalent.

Note: You must format the IC memory card before using it.

The following types of IC memory cards are available:

- Flash
- SRAM
- Combination flash and SRAM

SRAM and combination cards have a system backup battery to preserve the programs and data.

Part Numbers and Feature Numbers

Description	Part Number	Feature Number
IC Card, 0.5MB SRAM	04G1470	2011
IC Card, 0.5MB Flash ROM	04G1472	2013
IC Card, 2.0MB Flash ROM	04G1473	2014
IC Card, 0.5MB Flash/0.5MB SRAM	04G1474	2015
IC Card, 1.0MB Flash/0.5MB SRAM	04G1475	2016
Printer, Thermal, 40 cps	92F1132	2022
Breakout Box	92F1131	2023

Figure 8-1. Features

Contact your IBM Marketing Representative to order the following supplies and accessories.

Description	Part Number	Feature Number
Printer Paper	92F1139	2019
Battery, System Backup	92F1136	2020
Battery, IBM IC Memory Card	92F1137	2021

Figure 8-2. Supplies

Description	Part Number	Feature Number
Battery, Rechargeable	92F1135	2001
Battery Charger, 110 V ac	92F1145	2003
Telephone Cable	92F1138	2007
Battery Charger, 12 V dc	92F1146	2002
Carrying Case, System only	92F1140	2004
Cellular Handset	92F1134	2008
Carrying Strap	92F1142	2006

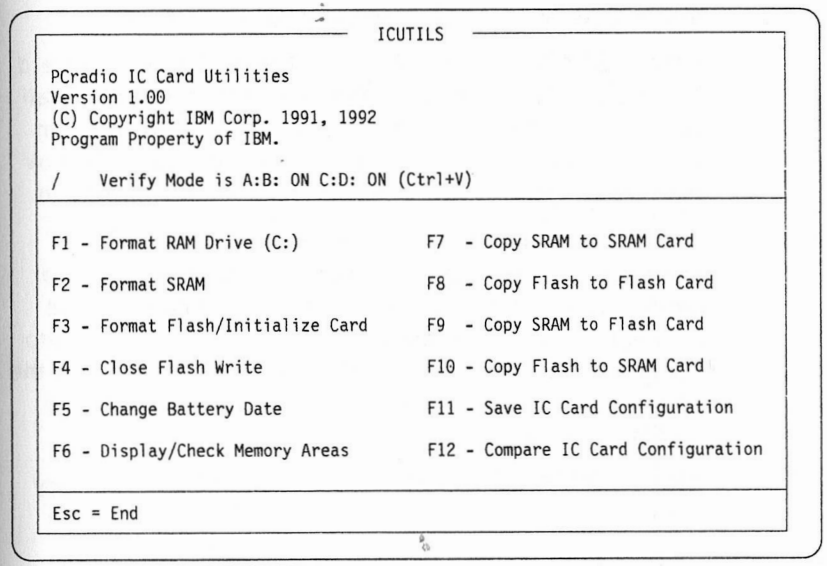
Figure 8-3. Accessories

Description	Part Number	Feature Number
Conversion Kit, Model 001 to 002	92F1148	2017
Conversion Kit, Model 001 to 003	92F1149	2018

Figure 8-4. Conversion Kits

Appendix A. Using the IC Card Utilities

You can use the IC Card Utilities to perform functions on your IC memory card, such as formatting and copying. You access the ICUTILS screen through diagnostics.


ICUTILS
PCradio IC Card Utilities
Version 1.00
(C) Copyright IBM Corp. 1991, 1992
Program Property of IBM.
/ Verify Mode is A:B: ON C:D: ON (Ctrl+V)
F1 - Format RAM Drive (C:)
F2 - Format SRAM
F3 - Format Flash/Initialize Card
F4 - Close Flash Write
F5 - Change Battery Date
F6 - Display/Check Memory Areas
F7 - Copy SRAM to SRAM Card
F8 - Copy Flash to Flash Card
F9 - Copy SRAM to Flash Card
F10 - Copy Flash to SRAM Card
F11 - Save IC Card Configuration
F12 - Compare IC Card Configuration
Esc = End

Note: *Memory size* in this appendix refers to formatted size.

The actions associated with the function keys (F keys) are as follows:

F1 Format RAM Drive C - Formats RAM drive C on the system. This storage area uses the rechargeable battery and the system backup battery to maintain stored data. If you remove both of these batteries or they are too weak to maintain data, you will have to format RAM drive C.

F2 Format SRAM - Formats the SRAM on an IC memory card. The program formats an IC memory card composed of all SRAM as RAM drive A. On a combination card, you can choose to format the SRAM as RAM drive A or B. Follow the screen prompts and enter the requested information.

F3 Format Flash/Initialize Card - Formats a Flash or combination card. You must format a Flash card before storing data on the card. Part of the formatting process consists of writing certain information about the card into the memory area. You can define the memory area on the combination card as either drive A or B. Generally, the SRAM is defined as drive A.

F4 Close Flash Write - Completes formatting the IC memory card.

F5 Change Battery Date - Changes the battery date on an SRAM IC memory card. Follow the screen prompts and enter the requested information. Check the publications that came with the memory card so that you enter the correct battery life.

F6 Display/Check Memory Areas - Displays the location and a brief status of the available memory areas. If a memory area is available but not formatted, a `Not Formatted For DOS` message appears. This may also indicate the memory area is other than a computer memory card, that is, the card is for a video cassette recorder (VCR) or similar device.

Note: Verify mode should be ON for all drives before selecting this function.

F7 Copy SRAM to SRAM Card - This function is similar to the DOS DISKCOPY command. This option permits copying data from one memory card to another memory card, or from one area of a memory card to another area of the same memory card.

The screen prompts ask that you insert the source memory card to begin the process. When the data is ready for transfer, a screen prompt appears requesting the insertion of the target memory card. You may need to switch memory cards several times depending on the amount of data copied.

Notes:

1. This function and F8 copies all information from the source device to the target device. This includes certain information about the device size. For example, if you copy from a .5MB source device to a 1MB target device, the target device will have .5MB of accessible storage area. You can only access the remaining .5MB after reformatting the entire 1MB memory area. You cannot copy data of greater memory size than exists on the target SRAM memory card.
2. If the program encounters a defective memory area, it gives you the option to ignore the error and continue with the copy function. In this case, the target area may not be valid.

F8 Copy Flash to Flash Card - This function is similar to F7 except that it copies Flash memory cards. Copying Flash memory cards takes longer than copying SRAM, but the procedure is the same.

Note: You cannot copy data of greater memory size than exists on the target Flash memory card. For example, you cannot copy a 1MB Flash card to a .5MB Flash card.

F9 Copy SRAM to Flash Card - This function is similar to F7 except that it copies data from the source SRAM memory card to the target Flash memory card.

Note: You cannot copy data of greater memory size than exists on the target Flash memory card.

F10 Copy Flash to SRAM Card - This function is similar to F7 except that it copies data from the source Flash memory card to the target SRAM memory card.

Note: You cannot copy data of greater memory size than exists on the target SRAM memory card.

F11 Save Flash Configuration - This function saves the physical and electrical information about the Flash memory to a drive and file name that you specify. Follow the screen prompts and enter the requested information. Use this function with F12.

F12 Compare Flash Configuration - This function compares the Flash configuration information on a memory card to that of the saved Flash configuration. This allows verification of the data and format of the information stored on the memory card to the information in the saved file. Specify the drive and file name in which you saved the information, then follow the screen prompts.

CTRL + V Toggles Verify mode ON or OFF on drives A, B, C, and D as follows:

Drives A: and B:	Drives C: and D:
ON	ON
OFF	OFF
ON	OFF
OFF	ON

ON ON is the default during diagnostics. When you select the last setting and press CTRL + V again, the system wraps around and selects the first setting. When Verify mode is ON, the system scans storage areas for errors and uses a more extensive test during the format function.

Error Messages - ICUTILS

The following are the possible error messages and their meanings:

IC card not installed!
The IC memory card is not fully installed in the drive or the drive is failing.

Error checking SRAM size!
The SRAM is either not formatted, formatted for use in another device such as a video cassette recorder (VCR), or has a formatting error. Initialize the memory card by pressing F3.

Possible wrap card installed!
You may have installed the IC wrap test card.

Bad or missing date information!
The battery date information is incorrect. The format information on the memory card does not allow battery date information. Flash memory does not require date information.

Bad or missing format information!
The format information is incorrect. Reformat the memory card.

CHECKING ERROR!
The program located a memory area but could not read it. Press F6 to locate the failing memory area, then format the area.

INVALID COMMAND RECEIVED!
An invalid command was received from the application running in your PS/2 system. Check the parallel or serial connection and verify you have the proper programs running in your PS/2 system.

Invalid error checking code!
The error checking type defined by the configuration of your IC memory card is not supported or is incorrect.

Card is write protected!
You cannot write to the indicated memory card. Move the write protect switch to the correct position.

TARGET memory space is too small!

The formatted space on the IC card that you are copying to is less than the space contained on your original card.

CLOSE FAILED!

An error occured writing the buffered information to your Flash card. This may be the result of modifying a file, erasing a file, exceeding the sub-directory buffer capabilities, or a defective card.

COPY FAILED!

An error occured while you were copying an IC card. The information on the card you were copying to may not be usable.

TEST FAILED!

An error occured while testing an area of your IC card. The IC card may not be usable. Try initializing the card with F3.

ERASE FAILED!

The program could not erase the selected data. Note any other screen message that may appear, and follow those instructions.

FORMAT FAILED!

The memory area could not be formatted correctly. Try initializing the card with F3.

Error reading source drive!

An error occured while reading the source drive during a copy operation. If you choose to continue the copy process after this error, the information on your target drive may be invalid.

Error processing config file!

The specified configuration file name is invalid, could not be found, or an error occured while attempting to read or write it.

Config data does not compare!

The configuration information on your IC card does not match the configuration data in the file you specified.

Not formatted for DOS!

This may indicate the memory area is not formatted or the IC memory card is other than a computer memory card. The card may be for a VCR or similar device.

Error loading shell!

The DOS shell (Ctrl D) could not be started. Retry the procedure. You cannot use the DOS shell with the Diagnostics program.

ERROR - Low or dead card battery!

Replace the IC memory card battery.

Warning - Low IC card battery!

Replace the IC memory card battery.

ERROR - Dead IC card battery!

Replace the IC memory card battery.

ERROR - Too many long links!

The configuration information on the IC memory card is incorrect.

ERROR - Card not erased!

A Flash close was attempted (F4) and the buffered area on the IC memory card was not erased. Make sure you have the original IC memory card installed.

ERROR - Program only runs on a PCradio!

The machine you are using is not a PCradio system.

ERROR - No SRAM or bad config!

You attempted to format an IC memory card that does not contain SRAM or the configuration information is incorrect.

ERROR - Invalid label!

You entered an invalid label character or all blanks.

Error reading target drive! Duplicating source data

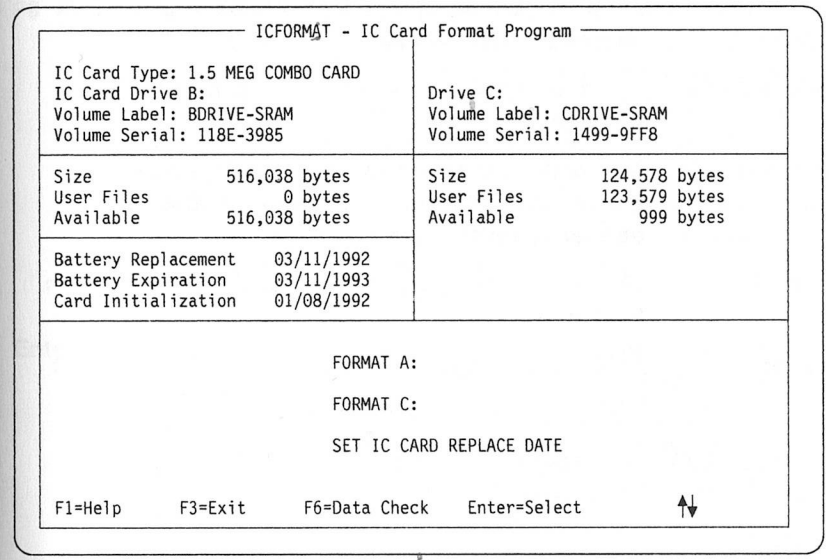
An error occured while reading the target drive during a copy operation. The configuration information from the source drive will be used on the target.

ERROR - reading sector nnnnn

A checking error occured while reading sector nnnnn on the drive. Attempt to recover any information from the drive and reformat it.

Appendix B. Using the ICFORMAT Screen

You can use the ICFORMAT screen to format the IC memory card for DOS before using the card in the system. Type FORMAT at the DOS prompt to display the ICFORMAT screen.



The information displayed shows the type of memory card installed and the location of any available SRAM. The SRAM can exist as drive A or B. The memory card information appears at the top-left portion of the screen. The system drive C RAM information appears at the top-right portion of the screen.

On an unformatted memory card, some information may not appear until you format the card. The battery information only appears if you installed a battery and selected the Replace Date option. Also, the card initialization date may or may not exist and is not an ICFORMAT option.

Other information is as follows:

IC Card Type This is the type of memory contained in the installed memory card, and the total memory size in bytes.

IC Card Drive This is the location of available SRAM. Memory card SRAM can be either drive A or B.

Volume Label This is the name the user gives to the formatted memory card during the formatting process. This information is optional.

Volume Serial This information is assigned by the formatting program.

Size This is the available storage capacity, in bytes, of the selected SRAM area. The information only appears after formatting.

User Files This is the total size, in bytes, of all files located in the SRAM.

Available This is the amount of free space available to store data.

Select an action by pressing the ↑ and ↓ keys, and then pressing Enter. Press F1 for Help on each screen.

FORMAT

The program displays this option when it senses any SRAM on the card. Select one of the format options and press **Enter**. The "Format Comfirmation" screen appears. Follow the screen instructions to continue. If the program senses a dead IC memory card battery, it displays a warning message. Formatting can continue, but the formatting and data is lost upon removal of the memory card or loss of system power. A format error can also appear on an IC memory card.

SET IC CARD REPLACE DATE

Use this selection to set the replacement date and the number of months until expiration for the memory card battery. Refer to the memory card manufacturer's specifications for estimated battery life. You can set the expiration date (**Number of Months** field) to zero if, for example, the battery being used is not new and you want a reminder for replacement. Press **Enter** to save the

information. If the system senses a dead battery, a warning message appears.

F1 Help - Press this key to display information about the current screen.

F3 Exit - Press this key to exit the current active screen and return to the prior screen.

F6 Data Check - The two types of data error checking are Checksum and Cyclic Redundancy Checking (CRC). CRC provides a high level of data checking and warns of lost information. Checksum checks for fewer types of data errors, and thus runs faster than CRC. The speed difference may not be noticeable in many applications. CRC is the default when ICFORMAT is allowed to change the Data Checking Option. Some memory cards do not allow changing the error detection setting. No Data Checking is also an option.

Enter Select - Press this key to take the specified action of the highlighted item. For example, if `SET IC CARD REPLACE DATE` is highlighted, pressing the **Enter** key starts the battery replacement date procedure. After typing the battery replacement date, pressing **Enter** saves the information and returns to the Main Menu.

Appendix C. Understanding IC Memory Cards

The PCradio system uses a new technology Integrated Circuit (IC) memory card to replace the current diskette drive. This new removable storage device is much smaller and faster than existing media. It is also much more ruggedized. IC memory cards are available from many manufacturers including IBM. The cards can use several different types of IC storage; the most popular of which is SRAM and Flash. Cards available from IBM have the following types of storage:

- All SRAM
- All Flash
- Combination cards with both Flash and SRAM

SRAM is very similar to the common Static RAM used in most PC main storage. This is read-write storage - it does not have any restrictions on the number of times it can be read or written. An integrated battery backs up the storage when not in use.

Flash is much different. To write data to Flash, you must first erase it completely. The erase process sets all bits in the storage to 1's. This process also requires special higher programming voltages and some critical time limitations. After erasing the Flash, you can write individual bits to 0's using another programming process. After writing a bit to zero, you cannot change it unless you erase the Flash again. This procedure is very similar to the procedure used to program the content of existing EPROM or PROM chips.

The PCradio system can erase and program the Flash IC memory cards.

How DOS Uses IC Memory Cards

When DOS creates a file, it normally does the following steps:

1 Determine the characteristics of the drive. DOS reads the drive's boot sector. The boot sector contains information that describes the format and size of the media. (This is a read-only process.)

2 Search the drive's directory to find an open entry. The directory is initially created with all 0's for the entries. When DOS uses a directory entry, it replaces the 0's with descriptive information about the file. (This is a read-only process.)

3 Search the drive's File Allocation Table (FAT) to find an available space to create the file. DOS searches for an all 0's entry in the table. (This is a read-only process.)

4 Write the new file's data. This is normally to a previously unused area of the drive. DOS can easily do this with Flash by writing the current 1's content to 0's.

5 Write a new directory entry that describes the file and its starting location on the drive. (This requires changing data that is currently 0's.)

6 Update the FAT to indicate the size and location of the file. (This also requires changing data that is currently 0's.)

Because you cannot change Flash content after setting it to 0's without erasing the entire card, the process to store programs is more complex and takes advantage of the way DOS stores data.

DOS Disk Layout

A DOS drive has each of its major elements aligned in sequential order:

1 Boot Sector - Contains descriptive information about the drive structure and the initial program load program.

2 FAT - One or more File Allocation Tables immediately follow the Boot Sector. The Boot Sector contains the size and number of FAT's. DOS uses the FAT to allocate specific areas to programs and data files.

3 Root Directory - The directory immediately follows the FAT's. The size and number of entries are in the Boot Sector. The directory contains the names and starting location of all of the data on the drive.

4 Data - The actual file data immediately follows the Root Directory.

Because you cannot update Flash, you need a temporary buffer that contains the FAT and Root Directory. These buffered parts are the only things that require changes as you write data to the Flash.

When DOS attempts to read or write the FAT or Root Directory, a device driver intercepts those functions and redirects them to an internal RAM buffer.

After writing all data to the Flash, the buffered data can then be written. After this final close process is complete, you can remove the Flash card and use it on other systems.

Appendix D. Product Warranty and Notices

International Business Machines Corporation Armonk, New York, 10504

Statement of Limited Warranty

The warranties provided by IBM in this Statement of Limited Warranty applies only to Machines you originally purchase for your use, and not for resale, from IBM or an IBM authorized reseller. The term "Machine" means an IBM machine, its features, conversions, upgrades, elements, or accessories, or any combination of them. Machines are subject to these terms only if purchased in the United States or Puerto Rico, or Canada, and located in the country of purchase. If you have any questions, contact IBM or your reseller.

Machine: IBM 9075 PCradio

Warranty Period*: One year

**Elements and accessories are warranted for three months. Contact your place of purchase for warranty service information.*

Production Status

Each Machine is manufactured from new parts, or new and serviceable used parts (which perform like new parts). In some cases, the Machine may not be new and may have been previously installed. Regardless of the Machine's production status, IBM's warranty terms apply.

The IBM Warranty

IBM warrants that each Machine 1) is free from defects in materials and workmanship and 2) conforms to IBM's Official Published Specifications. IBM calculates the expiration of the warranty period from the Machine's Date of Installation. The date on your receipt is the Date of Installation, unless IBM or your reseller informs you otherwise.

During the warranty period, IBM or your reseller will provide warranty service under the type of service designated for the Machine and will manage and install engineering changes that apply to the Machine. IBM or your reseller will specify the type of service.

For a feature, conversion, or upgrade, IBM or your reseller may require that the Machine on which it is installed be 1) the designated, serial-numbered Machine and 2) at an engineering-change level compatible with the feature, conversion, or upgrade. Some of these transactions (called "Net-Priced" transactions) may include additional parts and associated replacement parts that are provided on an exchange basis. All removed parts become the property of IBM and must be returned to IBM.

Replacement parts assume the remaining warranty of the parts they replace.

If a Machine does not function as warranted during the warranty period, IBM or your reseller will repair or replace it without charge. If IBM or your reseller is unable to do so, you may return it to your place of purchase and your money will be refunded.

If you transfer a Machine to another user, warranty service is available to that user for the remainder of the warranty period. You should give your proof of purchase and this Statement to that user.

Warranty Service

To obtain warranty service for the Machine, you should contact your reseller or call IBM. In the United States, call IBM at **1-800-IBM-SERV (426-7378)**. In Canada, call IBM at **1-800-465-6666**. You may be required to present proof of purchase.

Depending on the Machine, the service may be 1) a "Repair" service at your location (called "On-site") or at one of IBM's or a reseller's service locations (called "Carry-in") or 2) an "Exchange" service, either On-site or Carry-in.

When a type of service involves the exchange of a Machine or part, the item IBM or your reseller replaces becomes its property and the replacement becomes yours. The replacement may not be new, but will be in good working order.

It is your responsibility to:

1. obtain authorization from the owner (for example, your lessor) to have IBM or your reseller service a Machine that you do not own;
2. where applicable, before service is provided —
   a. follow the problem determination, problem analysis, and service request procedures that IBM or your reseller provide,
   b. secure all programs, data, and funds contained in a Machine,
   c. inform IBM or your reseller of changes in a Machine's location, and
   d. for a Machine with exchange service, remove all features, parts, options, alterations, and attachments not under warranty service. Also, the Machine must be free of any legal obligations or restrictions that prevent its exchange; and
3. be responsible for loss of, or damage to, a Machine in transit when you are responsible for the transportation charges.

Extent of Warranty

IBM does not warrant uninterrupted or error-free operation of a Machine.

Misuse, accident, modification, unsuitable physical or operating environment, improper maintenance by you, or failure caused by a product for which IBM is not responsible may void the warranties.

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In Canada, warranties include both warranties and conditions.

Some jurisdictions do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply to you.

Limitation of Liability

Circumstances may arise where, because of a default on IBM's part (including fundamental breach) or other liability (including negligence and misrepresentation), you are entitled to recover damages from IBM. In each such instance, regardless of the basis on which you are entitled to claim damages, IBM is liable only for:

1. bodily injury (including death), and damage to real property and tangible personal property; and
2. the amount of any other actual loss or damage, up to the greater of $100,000 or the charge for the Machine that is the subject of the claim.

Under no circumstances is IBM liable for any of the following:

1. third-party claims against you for losses or damages (other than those under the first item listed above);
2. loss of, or damage to, your records or data; or
3. economic consequential damages (including lost profits or savings) or incidental damages, even if IBM is informed of their possibility.

Some jurisdictions do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you.

This warranty gives you specific legal rights and you may also have other rights which vary from jurisdiction to jurisdiction.

Electronic Emission Notices

Federal Communications Commission (FCC) Statement

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that harmful interference will not occur in a particular installation. If this equipment does cause harmful interference to radio and television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult and IBM authorized dealer or service representative for help.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

FCC Statement Pursuant to Part 68

This equipment complies with Part 68 of the FCC rules. On the bottom of this equipment is a label that contains, among other information, the FCC registration number and ringer equivalence number (REN) for this equipment. If requested, this information must be provided to the telephone company.

This equipment uses the following USOC jack: RJ11C

The REN is used to determine the quantity of devices which may be connected to the telephone line. Excessive RENs on the telephone line may result in the devices not ringing in response to an incoming call. In most, but not all areas, the sum of the RENs should not exceed five (5). To be certain of the number of devices that may be connected to the line, as determined by the total RENs, contact the telephone company to determine the maximum REN for the calling area.

If this equipment causes harm to the telephone network, the telephone company will notify you, in advance, that temporary discontinuance of service may be required. If advance notice isn't practical, the telephone company will notify the customer as soon as possible. Also, you will be advised of your right to file a complaint with the FCC if you believe it is necessary.

The telephone company may make changes to its facilities, equipment, operations, or procedures that could affect the operation of the equipment. If this happens, the telephone company will provide advance notice in order for you to make the necessary modifications in order to maintain uninterrupted service.

If trouble is experienced with this equipment, please contact IBM for repair and/or warranty information at telephone number 1-800-IBM-SERV. If the trouble is causing harm to the telephone network, the telephone company may request you to remove the equipment from the network until the problem is resolved.

There are no user serviceable components. For repair and/or warranty information call IBM at telephone number 1-800-IBM-SERV.

This equipment cannot be used on telephone-company provided coin service. Connection to party lines is subject to state tariffs.

When programming and/or making test calls to emergency numbers:

- Remain on the line and briefly explain to the dispatcher the reason for the call.
- Perform such activities during off-peak hours such as early morning or late evenings.

Equipment Attachment Limitations

The Canadian Department of Communications label identifies certified equipment. This certification means that the equipment meets certain telecommunications network protective, operational, and safety requirements. The Department does not guarantee the equipment will operate to the user's satisfaction.

Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. In some cases, the company's inside wiring associated with a single line individual service may be extended by means of a certified connector assembly (telephone extension cord). The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations.

Repairs to certified equipment should be made by an authorized Canadian maintenance facility designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment.

Users should ensure for their own protection that the electrical ground connections of the power utility, telephone lines, and internal metallic water pipe system, if present, are connected together. This precautions maybe particularly important in rural areas.

CAUTION:
Users should not attempt to make such connections themselves, but should contact the appropriate electric inspection authority, or electrician, as appropriate.

ATTENTION !
N'essayez pas de réaliser ces connexions vous-même ; prenez contact avec la personne responsable de l'installation électrique ou avec un électricien, selon le cas.

Equipment Load Number

The LOAD NUMBER (LN) assigned to each terminal device denotes the percentage of the total load to be connected to a telephone loop which is used by the device, to prevent overloading. The termination on a loop may consist of any combination of devices subject only to the requirement that the total of the LOAD NUMBERS of all the devices does not exceed 100.

THE LOAD NUMBER OF THIS UNIT IS 2.

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PCradio

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Glossary

activity monitor. Detects useful system operation by monitoring I/O cycles, video memory write cycles, and DMA cycles. No activity may force Sleep mode.

ASCII. American Standard Code for Information Exchange

cellular modem. A communication device for data facsimile or voice transmission and reception that operates in the public bands: 824—849 MHz transmit and 869—894 MHz receive.

CRC. cyclic redundancy checking

data. (1) A representation of facts, concepts, or instructions in a formalized manner suitable for communication, interpretation, or processing by human or automatic means. (2) Any representations, such as characters or analog quantities, to which meaning is, or might be assigned.

doze mode. A power save mode that is transparent to the user, and usually entered after a 1—5 second period of inactivity. The system reduces the processor clock speed and the processor executes a HALT instruction. The system components remain powered on. The system exits this state with any interrupt.

EPROM. erasable programmable read-only memory

ESN. electronic serial number

format. The arrangement or layout of data on a data medium.

GID. group identification number

hardware. (1) Physical equipment used in data processing, as opposed to programs, procedures, rules, and associated documentation. (2) Contrast with software.

IC. integrated circuit

IPCH. initial paging channel

interface. A device that alters or converts actual electrical signals between distinct devices, programs, or systems.

KB. 1024 bytes.

LCD. liquid crystal display

LED. light emitting diode

load. In programming, to enter data into storage or working registers.

MB. 1 048 576 bytes.

microprocessor. An integrated circuit that accepts coded instructions for execution; the instructions may be entered, integrated, or stored internally.

MIN. mobile identification number

modem (modulator-demodulator). A device that converts serial (bit-by-bit) digital signals from a business machine (or data communication equipment) to analog signals that are suitable for transmission in a telephone network. The inverse function is also performed by the modem on reception of analog signals.

NAM. number assignment mode

operating system. Software that controls the execution of programs; an operating system may provide services such as resource allocation, scheduling, input/output control, and data management.

OLC. overload class

parallel port. A port used to attach devices such as dot matrix printers; it transmits data one byte at a time.

power management. A combination of hardware and microcode which reduces current consumption to prolong battery life.

PCMCIA. PC Memory Card International Association

POST. Power-on self-test

power-on self-test. A series of diagnostic tests that runs automatically when the power of a device is turned on.

processor. (1) In a computer, a functional unit that interprets and executes instructions. (2) A functional unit, part of another unit such as a terminal or a processing unit, that interprets and executes instructions. (3) Deprecated term for processing program. (4) See microprocessor.

program. (1) A series of actions designed to achieve a certain result. (2) A series of instructions telling the computer how to handle a problem or task. (3) To design, write, and test computer programs.

radio packet modem. A communication device for digital data transmission that operates in the shared or private mobile bands: 806—821 MHz for transmit and 851—866 MHz for receive.

RAM. Random access memory; a storage device whose contents can be modified.

RH. Relative humidity

ROM. Read-only memory; a storage device whose contents cannot be modified. The system retains the memory when powered off.

RF. Radio frequency

RSSI. received signal strength indicator

serial port. A port used to attach devices such as modems; it transmits data one bit at a time.

setup. (1) In a computer that consists of an assembly of individual computing units, the arrangement of interconnections between the units, and the adjustments needed for the computer to operate. (2) The preparation of a computing system to perform a job or job step. An operator usually performs Setup and other functions, such as mounting tape reels, to prepare the system. (3) The preparation of the system for normal operation.

sleep mode. A broader power save mode in which the system removes power from most of the I/O components. It is usually entered after an extended period of inactivity. After the devices have been shut off, the processor disables the system tick interrupt and executes a HALT instruction. The system exits this state when you press the Resume key or when it receives any I/O interrupt.

software. (1) Computer programs, procedures, and rules concerned with the operation of a data processing system. (2) Contrast with hardware.

SRAM. Static RAM

suspend mode. The system powers off all peripherals and devices, but powers on the main system memory and retains its contents. The user can request to enter this mode, or the system may enter this mode because of a thermal warning or low battery shutdown.

SID. system identification number for a cellular radio modem; secondary identification number for a radio packet modem.

TSR. terminate and stay resident

typematic. Keyboard buttons that repeat when pressed and held.

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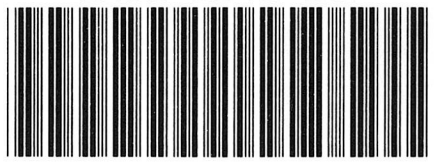

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